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A REVISION OF THE PERUVIAN SPECIES OF MONNINA

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With ten plates

INTRODUCTION

THE GENUS *Monnina*, of the Polygalaceae, is a strictly American group of approximately 150 species, occurring principally in northwestern South America, the greater number of species being concentrated in Colombia, Ecuador, and Perú. No comprehensive monographic study of the genus in South America has been published, although between 1894 and 1934 Prof. R. Chodat described numerous species of *Monnina* and on one occasion published a synoptic treatment. The present paper is limited in scope to the Peruvian species; at a later date the author hopes to undertake a revision of all the South American species.

Monnina was founded in 1798 by Ruiz & Pavón and included the following species: *M. polystachya*, *M. salicifolia*, *M. conferta*, *M. linearifolia*, *M. macrostachya*, and *M. pterocarpa*. Of these species, five had been discovered in the central part of Perú and one, *M. linearifolia*, in the "Regni Chilensis." The type of the genus is *M. polystachya*. The generic name was dedicated in honor of Don José Moñino, Conde de Floridablanca, who was a patron of scientific expeditions of his period.

MORPHOLOGY

Root. Of the 46 species studied and included in the present treatment, the roots of only the annual species have been examined. Among these annual species, *M. graminea* was not available in the material at hand, and the specimens of *M. pterocarpa* all lacked roots. *Monnina amarella*, *M. filifolia*, *M. Macbridei*, and *M. arenicola* have a more or less perpendicular and simple root. In contrast, *M. herbacea*, *M. ramosa*, *M. Weberbaueri*, and *M. macrostachya* have a root that is much branched, sinuous, and with very flexuous branches.

STEM. Although the stems of some species are herbaceous and not very firm, the predominant type of stem in the genus is distinctly woody.

Among the species with herbaceous stems may be mentioned *M. amarella*, *M. filifolia*, *M. graminea*, *M. herbacea*, *M. Macbridei*, *M. arenicola*, *M. Weberbaueri*, and *M. macrostachya*. The remaining species have woody stems, which are either erect or twining. Characteristic of the species with twining stems are *M. ovata*, *M. polystachya*, *M. Pavoni*, *M. pseudopolystachya*, and *M. Mathusiana*. *Monnina marginata* and *M. pilosa* are arborescent species. The stem is sometimes terete, as in all the annual species except *M. herbacea* and in many of the suffruticose species, and sometimes striate, as in *M. herbacea* and the bulk of the suffruticose species. As a rule the stems are branched from the base, but in some cases the branching is corymbose, as in *M. filifolia*, *M. graminea*, *M. macrostachya*, and *M. conferta*. Rarely, as in the arborescent *M. marginata*, the crown of the plant is strongly and copiously branched. Furthermore, the branches may be either decurrent or divaricate. They are decurrent in *M. longibracteata*, *M. huallagensis*, *M. Vitis-Idaea*, and *M. pseudopolystachya*, and divaricate in *M. tomentella*. In *M. Vitis-Idaea* the branches are not only corymbose, but also decurrent. Most species are more or less pubescent, but *M. huallagensis*, *M. glabrifolia*, *M. marginata*, *M. Vitis-Idaea*, and *M. ovata* are glabrous. The stem may also be characterized by having conspicuous nodes, as in *M. andina*, *M. Vitis-Idaea*, *M. salicifolia*, and *M. peruviana*.

LEAVES. In all the species of *Monnina* the leaves are alternate; occasionally they are crowded into groups. The leaf-blades are prevailing lanceolate or elliptic. Occasionally they are linear, as in *M. filifolia*, *M. graminea*, *M. ramosa*, and *M. Macbridei*, and rarely, as in *M. amarella*, oblanceolate. Foliar dimorphism is present, at least among our species, only in *M. pterocarpa*, of which the upper leaves are linear and the lower ones ovate. The leaf-apex is usually obtuse or acute, but in some species it is acuminate. In *M. amarella* and *M. arenicola* the leaves are obtuse and emarginate at apex, while in *M. graminea* they are acute and mucronate. *Monnina pachycoma* also has the leaf-apex lightly mucronate. The leaf-margins are entire; although Chodat has stated that the leaves of *M. menthoides* are more or less sinuose-dentate, I have not seen herbarium specimens which permit me to verify this observation. Usually the leaf-margins are flattened, being more or less revolute only in *M. ramosa*, *M. andina*, *M. Vitis-Idaea*, *M. conferta*, *M. stipulata*, *M. Lechleriana*, *M. salicifolia*, *M. decurrens*, *M. densecomata*, and *M. pachycoma*. The nervation of the lamina is pinnate, the lateral nerves varying from four to ten pairs. For example, *M. pterocarpa* has four or five pairs of secondaries, while *M. glabrifolia*, *M. macrosepala*, *M. ovata*, and *M. densecomata* have nine or ten pairs. Only *M. filifolia*, *M. ramosa*, and *M. Macbridei* have leaf-blades which are essentially 1-nerved. The midrib is always conspicuous on the lower leaf-surface, with the exception of *M. ramosa*. In texture the blades vary from herbaceous, as in most of the species, to coriaceous in such species as *M. glabrifolia*. Except for *M. filifolia*, the leaves of which lack a petiole, the Peruvian species of *Monnina* have

petiolate leaves, although in *M. ramosa* the petiole is only 1 mm. long. The leaf-surfaces are usually more or less pubescent, but most often becoming glabrescent. They are glabrous even when young only in *M. glabrifolia*, *M. ovata*, and *M. decurrens*, while in *M. Ruiziana*, *M. pilosa*, and *M. tomentella* they are most densely pubescent.

PUBESCENCE. The presence of both simple and multicellular hairs has been observed. As a rule the indument is composed of short hairs which are soon lost, leaving the plant glabrescent. In the few species which have a dense pubescence the hairs are lax and somewhat yellowish, as in *M. polystachya*, where they attain a length of 2 mm.

INFLORESCENCE. The annual species and some of the suffruticose ones have simple racemes, which are either terminal or axillary, while in the other species the inflorescence is paniculate. However, in a few species the racemes may be either simple or aggregated in groups of two or three, as in *M. acutifolia*, *M. Vargasii*, *M. Herrerae*, and *M. pachycoma*. The peduncle varies greatly in length from species to species, being essentially suppressed in *M. decurrens*. The racemes are usually ascending, but in *M. divaristachya*, *M. Ruiziana*, and *M. connectisepala* they are conspicuously divaricate. All the climbing species have striate peduncles.

FLOWERS. The flowers of *Monnina* are zygomorphic and bisexual. The persistent calyx is composed of five concave sepals, three exterior and two interior. The outer sepals are free, while the two inner ones are sometimes united. The inner sepals, or wings, are petaloid and commonly dark blue in color, being pale pink only in *M. arenicola*. The two lower sepals, except in *M. glabrifolia*, are always shorter than the upper sepal. In some species, such as *M. macrosepala* and *M. pachycoma*, the three outer sepals are more or less equal in size to the wings. The wings always have the margin involute, or bent inward; their dorsal surfaces may be either glabrous or pubescent. The measurements of these parts, as given in my descriptions, represent the maximum and minimum observed in the available specimens, but in preparing the illustrations I always referred to the maximum measurements.

The corolla is composed of three petals, a median inferior one called the keel and two superior lateral ones, these being usually ligulate in shape and united with the staminal tube. The keel is usually yellow, but in *M. arenicola* it is essentially white and in *M. macrosepala* var. *latifolia* it is orange in color. The measurements given for the keel were made in its natural position in the flower, being actually measurements of the silhouette. The apex of the keel is commonly trilobed, although in *M. Macbridei*, *M. Vitis-Idaea*, and *M. decurrens* it is bilobed. Numerous species have pubescence on the interior surface of the keel, and some species, such as *M. callimorpha* and *M. pseudo-polystachya*, have the external and convex parts of the keel pubescent. The superior petals are usually spatulate and are more or less similar from species to species, differing only in size; in such species as *M. Weberbaueri* and *M. conferta* they are short, while in *M. Clarkeana* they are conspicuously elongated.

In *M. tomentella* the upper petals are densely pubescent, while in *M. ramosa* and *M. Lechleriana* they are essentially glabrous.

The stamens are six or eight. The only Peruvian species observed by me to have six stamens are *M. amarella* and *M. filifolia*, although it is probable that *M. graminea* (of which I have seen no material) also has six stamens. The stamens are partially or completely united into two groups. The free portion of the stamen is usually glabrous, but in *M. huallagensis* and *M. macrosepala* it is adorned with a few hairs. The length of the free part of the filaments varies from species to species, and the measurements given usually state the maximum and minimum observed. The anthers are bilocular, apically dehiscent, and usually subemarginate, being mucronate in *M. huallagensis*, *M. macrosepala*, *M. Vitis-Idaea*, *M. divaristachya*, and *M. Pavoni*. The apex of the pore may be ascending or outwardly reflexed.

The ovary is generally ellipsoid and glabrous, although when pubescent the hairs may be very dense (as in *M. herbacea*) or merely scattered toward the base, as in *M. divaristachya*, *M. polystachya*, and *M. Vargasii*. Sometimes the ovary bears numerous elongate hairs distally, as in *M. marginata*, *M. ovata*, *M. pseudo-polystachya*, and *M. peruviana*. The style is usually cylindric and geniculate, but in *M. ramosa*, *M. Macbridei*, and *M. arenicola* it is more or less straight, with a small inflexion near the stigma. The style may also be auriculate, as in *M. pterocarpa*, *M. amarella*, *M. filifolia*, and *M. graminea*. Most species have a glabrous style, but in *M. Pavoni*, *M. pseudo-polystachya*, *M. decurrens*, and *M. peruviana* the style bears hairs around its base or toward the middle. The stigma is bilobed, the lower lobe being usually acute and the upper lobe either bituberculate or simply tuberculate and papillose. It is to be noted that Chodat, in his descriptions, referred to the upper lobe of the stigma as the "inferior" one. In *M. filifolia* the stigma is more or less denticulate, the lobes being almost acute. The disk is generally reduced to a gland at the base of the ovary.

The fruit is a one-celled and one-seeded drupe or samara. Sometimes it is intermediate in character between a drupe and a samara, as in *M. herbacea*, *M. glabrifolia*, *M. menthoides*, *M. andina*, and *M. cyanea*. The last four species listed have the fruit cordate and margined and all occur in the same general region in southeastern Perú. *Monnina* has its fruits either glabrous or pubescent; certain of the annual species, such as *M. filifolia*, *M. ramosa*, and *M. macrostachya*, have samaras which are at first finely pubescent but eventually glabrescent.

The pedicels are always terete and usually pubescent; they vary in length but are generally not very conspicuous.

POSITION OF THE GENUS

Monnina is a very distinct genus, being not very closely related to others in the Polygalaceae. It is perhaps most closely allied to *Polygala*, from which it is readily distinguished by the caducous sepals, the stamens conspicuously grouped into two fascicles, the filaments united almost up to

the attachment of the anthers, the more or less truncate stigma with two dissimilar lobes, and finally the indehiscent fruit, which is either a drupe or a samara.

DISTRIBUTION

In South America the distribution of the species of *Monnina* comprises chiefly the region of moderate climates of the Andes, from northern Colombia, with *M. parviflora* and *M. Smithii*, to southern Chile, with *M. linearifolia*, at a latitude of approximately 39°.

It seems evident that the largest concentration is in the Peruvian territory, where there are actually 46 species. The habitat is very distinct. Some species are endemic to the dunes near the ocean, such as *M. arenicola*, and others to the uplands or "punas" between 3500 and 4000 meters altitude, such as *M. densecomata* and *M. pachycoma*. Some are indigenous to the rainy subtropical region called "ceja de montaña," such as *M. macrosepala*.

Colombia also has an important concentration of species. According to the available material, the species of this country are distributed in the Oriental, Central, and Occidental Ranges of the Andes. Apparently there are centers in the Departments of Santander, Tolima, Caldas, Antioquia, and El Cauca, in regions called "templadas y frescas" at an altitude between 1500 and 3500 meters. The concentration decreases to the south, and Chile appears to have only two species, *M. linearifolia* and *M. retusa*. Probably *M. salicifolia* occupies the largest geographic area. It is present in the Andes of Ecuador, Perú, and Bolivia, between 1800 and 3600 meters altitude.

MATERIAL

All the material in the following important herbaria has been examined:

Arnold Arboretum, Harvard University	(A)
Chicago Natural History Museum	(Ch)
U. S. Department of Agriculture (National Arboretum)	(DA)
Gray Herbarium, Harvard University	(GH)
Missouri Botanical Garden	(M)
New York Botanical Garden	(NY)
Academy of Natural Sciences of Philadelphia	(Ph)
University of California	(UC)
United States National Herbarium	(US)

Many types and photographs and much authentic material belong to these herbaria. The morphological characters of the majority of the species have been illustrated by the author in order to show their differences. Sometimes the plates show only the floral structure of the species, without the habit, due to the absence of material; some species are not represented in the plates because there is no material available.

To the Directors and Curators of these institutions I am deeply grateful for the many courtesies they have extended.

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SYSTEMATIC TREATMENT

Monnina R. & P. Syst. Veg. 169 (1798); Bonpland in Ges. Nat. Freunde Berlin Mag. 2: 40 (1808); H.B.K. Nov. Gen. et Sp. 5: 409 (1821); DC. Prodr. 1: 338 (1824); Presl, Reliq. Haenk. 2: 101 (1827); Benth. & Hook. f. Gen. Pl. 1: 139 (1862); Chodat in E. & P. Nat. Pl. III. 4: 340 (1896).

Herbs, shrubs, or trees, sometimes scandent. Leaves alternate, entire or rarely denticulate, stipulate or without stipules, glabrous or pubescent, lanceolate, elliptic, linear, or rarely spatulate, sometimes more or less clustered, penninerved or rarely 1-nerved, petiolate or subsessile. Flowers in terminal or axillary racemes, rarely in aggregate racemes; peduncle short to very long, the upper part usually with bracts, rarely bractless. Sepals 5, the 3 outer herbaceous, free or the 2 lower united, the 2 inner (wings) petaloid and usually much larger, more or less concave. Petals 3, the lowermost (keel) carinate, the 2 upper ones ligulate, usually elongate, united below to the staminal sheath. Stamens 8 or 6, the filaments united nearly to apex into a sheath split on the upper side; anthers 1- or 2-celled, sometimes emarginate or mucronate. Ovary 1-celled, rarely 2-celled; style geniculate, very rarely more or less straight, auricled or without auricles, glabrous, sometimes pubescent; stigma with 2 dissimilar lobes, the lower more or less acute, the upper papillose with 1 or 2 tubercles. Disk usually reduced to a gland at base of ovary (hypogynous). Fruit a drupe with thin fleshy coat, the surface rugose, glabrous or pubescent, sometimes samaroid, narrowly and subequally winged, glabrous or strigillose.

KEY TO THE SPECIES

Plants annual, small; fruit usually winged, rarely without wings.

Androecium with 6 stamens, rarely with 8 stamens; style with 2 auricles.

Stem relatively thick, to 25 dm. high; lower leaves ovate-lanceolate, the upper linear-lanceolate. 1. *M. pterocarpa*.

Stem slender, always less than 10 dm. high; lower leaves linear-lanceolate or oblanceolate.

Racemes usually with a short axis, 1-2.8 dm. long; apex of leaves obtuse or emarginate, sometimes acuminate; wing of fruit almost always purple. 2. *M. amarella*.

Racemes always with a long axis, 1.8-4.5 dm. long; apex of leaves acute; wing of fruit greenish.

Lower leaves filiform; fruit puberulous; stamens united. 3. *M. filifolia*.

Lower leaves lanceolate; fruit glabrous; stamens free in the upper part, unequal. 4. *M. graminea*.

Androecium always with 8 stamens; style without auricles.

Ovary puberulous; stamens united for two-thirds their length, the free part conspicuous; style geniculate from near its base; fruit cordiform, densely puberulous. 5. *M. herbacea*.

- Ovary glabrous; stamens entirely united; style nearly straight or geniculate below the apex; fruit ovate, glabrescent, sometimes finely puberulous.
- Blade of leaves linear; keel glabrous within, the apex emarginate; upper petals elongate-spatulate.
- Root thick, subfrutescent; stem sparsely branched; margin of leaves revolute; lower sepals 3-nerved, ciliate; style thicker toward apex; fruit finely puberulous.....6. *M. ramosa*.
- Root thin, herbaceous; stem simple or with a few branches; margin of leaves not at all revolute; lower sepals 1-nerved, not ciliate; style cylindric; fruit glabrescent.....7. *M. Macbridei*.
- Blade of leaves ovate-lanceolate; keel puberulous within, the apex acute; upper petals short.
- Flowers white; lower sepals glabrous; base of keel obtuse, glabrous; fruit finely puberulous.....8. *M. arenicola*.
- Flowers not white; lower sepals ciliate; base of keel acute, ciliate; fruit more or less glabrescent.
- Drupe to 3 mm. long; upper sepal 3-nerved, glabrous beneath; upper stigma-lobe short.....9. *M. Weberbaueri*.
- Samara to 5 mm. long; upper sepal 5-nerved, puberulous beneath; upper stigma-lobe elongate, ciliate.....10. *M. macrostachya*.
- Plants perennial, frutescent or arborescent, sometimes scandent; fruit without wings, rarely with a very small wing.
- Lower sepals united.
- Inflorescence to 3.2 dm. long; flowers not crowded, with filiform and conspicuous bracts.
- Bracts of racemes with involute apex; leaves usually acute; upper petals short; anthers obtuse or emarginate.....11. *M. longibracteata*.
- Bracts of racemes with straight apex; leaves acuminate; upper petals elongate-spatulate; anthers mucronate.....12. *M. huallagensis*.
- Inflorescence to 2.2 dm. long; flowers crowded, without filiform bracts.
- Racemes simple, terminal; leaves usually lanceolate, rarely more or less elliptic.
- Ovary pubescent.
- Apex of racemes with oblanceolate bracts to 2 mm. wide, lax; fruit cordiform, strongly flattened; lower sepals 5-nerved and larger than the upper sepal.....13. *M. glabrifolia*.
- Apex of racemes without bracts or with narrow bracts less than 1 mm. wide; fruit ovate, slightly flattened; lower sepals 1-3-nerved, always smaller than the upper sepal.
- Leaves to 4.5 cm. long; racemes slender, lax; fruit ovate-cordiform, with a very small wing.
- Branches tomentose; leaves lanceolate, densely puberulous, acute-mucronate, sinuous-dentate; racemes hirsute...14. *M. menthoides*.
- Branches glabrescent; leaves more or less elliptic, glabrescent, obtuse, entire; racemes glabrescent.....15. *M. andina*.
- Leaves to 10 cm. long; racemes thicker, straight; fruit elliptic, not at all winged.
- Stem with branches corymbose; leaves narrowly lanceolate; lower sepals 1-nerved, the upper 3-nerved; wings puberulous beneath; central Perú.....16. *M. marginata*.
- Stem with branches not corymbose; leaves elliptic or more or less lanceolate; lower sepals 3-nerved, the upper 5-nerved; wings glabrous beneath; northern Perú.....17. *M. pseudo-salicifolia*.
- Ovary glabrous.
- Bracts of racemes conspicuous, linear-lanceolate, 3-6 mm. long; leaves linear-lanceolate, acuminate; outer sepals to 5 mm. long; free part of filaments puberulous.....18. *M. macrosepala*.
- Bracts of racemes inconspicuous, ovate-triangular, less than 2.5 mm. long;

leaves elliptic, rarely more or less lanceolate, obtuse; outer sepals to 3 mm. long; free part of filaments glabrous.

Branches conspicuously corymbose; leaves usually deciduous, to 4.5 cm. long.

Stem 3 dm. high; axis of inflorescence less than 1.6 cm. long; lower sepals 1-nerved, the nerve conspicuous; keel 2-lobed, glabrous within; upper petals elongate-spatulate; anthers mucronate.....

19. *M. Vitis-Idaea*.

Stem 18 dm. high; axis of inflorescence 3-10 cm. long; lower sepals 3-nerved, the nerves inconspicuous; keel 3-lobed, puberulous within; upper petals short, narrow; anthers not mucronate.

20. *M. conferta*.

Branches not corymbose; leaves not deciduous, to 9 cm. long.

Leaves with prominulous nerves, strongly revolute, largely petiolate, the petiole to 6 mm. long; branches densely puberulous; outer sepals 5-7-nerved; wings glabrous within; southern Perú.....

21. *M. stipulata*.

Leaves without prominulous nerves, not revolute, inconspicuously petiolate, the petiole to 2 mm. long; branches almost glabrescent; outer sepals 1-3-nerved; wings more or less puberulous within; central Perú.....

22. *M. canescens*.

Racemes in wide panicles; leaves usually elliptic, rarely more or less lanceolate. Ovary pubescent.

Erect shrub, glabrescent, rarely slightly puberulous.

Axis of panicle to 25 cm. long, the racemes glabrous; leaves to 13.5 cm. long, the costa with 8 or 9 pairs of lateral veins, the axil without leaflets; outer sepals 3-5-nerved; wings almost acute at the base; anthers mucronate; ovary with a few hairs near its base.....

23. *M. divaristachya*.

Axis of panicle to 13 cm. long, the racemes puberulous; leaves to 9.8 cm. long, the costa with 5 or 6 pairs of lateral veins, the axil with spatulate leaflets; outer sepals 1-nerved; wings obtuse at the base; anthers not at all mucronate; ovary entirely puberulous.....

24. *M. callimorpha*.

Scandent, usually densely hirsute, rarely glabrous.

Leaves elliptic or ovate, glabrescent, obtuse; branches striate, glabrescent; lower sepals 3-nerved; obtuse.....

25. *M. ovata*.

Leaves almost lanceolate, puberulous, acute; branches terete, densely hirsute; lower sepals 1-nerved, acute.

Hairs of branches to 2.5 mm. long, lax; leaves densely puberulous above; style glabrous; ovary slightly puberulous near its base.

26. *M. polystachya*.

Hairs of branches to 1 mm. long, rigid; leaves more or less glabrescent above; style puberulous; ovary totally puberulous.

Axis of panicle to 24 cm. long; branches more or less glabrescent; outer sepals glabrescent or slightly puberulous beneath; wings glabrous; keel densely puberulous within, glabrous on convex longitudinal line; ovary with short, strigose, inconspicuous hairs, sometimes glabrescent; style puberulous near its base; anthers mucronate.....

27. *M. Pavoni*.

Axis of panicle to 12 cm. long; branches puberulous; outer sepals strongly puberulous beneath, the hairs rigid; wings more or less puberulous beneath, ciliate; keel glabrescent or with a few inconspicuous hairs within, puberulous on convex longitudinal line; ovary with larger, numerous, rigid, ascendent, conspicuous hairs; style puberulous on the upper part; anthers not at all mucronate.

28. *M. pseudo-polystachya*.

Ovary glabrous.

Panicles with divaricate racemes; leaves elliptic; androecium with puberulous filaments.

Branches terete, densely hirsute; leaves to 5 cm. long....29. *M. Ruiziana*.

Branches striate, more or less glabrescent; leaves to 10 cm. long.....30. *M. connectisepala*.

Panicles with decurrent or ascendent racemes; leaves lanceolate; androecium with glabrous filaments.

Racemes and flowers conspicuously crowded; lower sepals obtuse, the upper 5-7-nerved; upper petals short.....31. *M. Lechleriana*.

Racemes and flowers not crowded; lower sepals acute, the upper 3-nerved; upper petals elongate-spatulate.....32. *M. Clarkeana*.

Lower sepals free.

Inflorescence in simple racemes, axillary or terminal.

Ovary glabrous.

Apex of racemes with ovate-acute and conspicuous bracts; branches glabrescent; lower sepals glabrous beneath, the upper sepal 7-nerved.....33. *M. ligustrifolia*.

Apex of racemes with triangular-acuminate and inconspicuous bracts; branches puberulous; lower sepals puberulous beneath, the upper sepal 3-5-nerved.

Petioles to 2.5 mm. long; leaves to 7 cm. long, elliptic, obtuse; wings ciliate on lower margin.....34. *M. salicifolia*.

Petioles to 5 mm. long; leaves to 11 cm. long, lanceolate, acuminate; wings glabrous on margin.....35. *M. hirtella*.

Ovary pubescent.

Branches conspicuously canescent-hirsute; length of leaves always less than 3 times their width; drupe cordiform, flattened; lower sepals usually 1-nerved; keel glabrous within, the lateral lobes elongate; style glabrous.....36. *M. cyanea*.

Branches more or less glabrescent; length of leaves almost always more than 4 times their width; drupe ovate or elliptic; lower sepals 3-nerved; keel puberulous within, the lateral lobes short; style puberulous.

Leaves elliptic, crowded, to 2.8 cm. long, obtuse; bracts of racemes to 1 mm. long, inconspicuous; outer sepals puberulous beneath; wings puberulous within.....37. *M. decurrens*.

Leaves linear-lanceolate, not crowded, to 10.5 cm. long, acute; bracts of racemes to 2.8 mm. long, conspicuous; outer sepals glabrous beneath; wings glabrous within.....38. *M. peruviana*.

Inflorescence in panicles or aggregate racemes.

Apex of leaves acuminate or acute.

Stem scandent, slightly hirsute; racemes numerous, lax, slender, with filiform bracts.....39. *M. Mathusana*.

Stem not scandent, erect, densely hirsute; racemes not numerous, aggregate, ascendent, thicker, usually with ovate-lanceolate bracts.

Axis of racemes to 31 cm. long; blade of leaves thin, with 5 or 6 pairs of lateral veins.....40. *M. acutifolia*.

Axis of racemes to 10 cm. long; blade of leaves thicker, with 7 or 8 pairs of lateral veins.

Leaves lanceolate; wings ciliate; ovary more or less puberulous; southern Perú.....41. *M. Vargasii*.

Leaves oblong; wings glabrous; ovary glabrous; northern Perú.....42. *M. pilosa*.

Apex of leaves usually obtuse, rarely acute.

Racemes numerous; wings puberulous beneath.

Marg'n of leaves conspicuously revolute, the apex not attenuate; racemes lax, the axis to 12.5 cm. long; upper sepal obtuse; wings glabrous within; keel puberulous within; southern Perú....43. *M. densecomata*.

- Margin of leaves not revolute, the apex more or less attenuate; racemes rigid, the axis to 18 cm. long; upper sepal acute; wings puberulous within; keel glabrous within; northern Perú.....44. *M. tomentella*.
 Racemes aggregate, sometimes simple, terminal; wings glabrous beneath.
 Leaves acute, to 9 cm. long; petioles to 7 mm. long; outer sepals to 3.5 mm. long, puberulous beneath, the apex straight, the two lower 1-nerved; keel to 6 mm. long.....45. *M. Herreræ*.
 Leaves obtuse, to 6 cm. long; petioles to 4.5 mm. long; outer sepals to 7 mm. long, glabrous beneath, the apex involute, the two lower 3-nerved; keel to 8 mm. long.....46. *M. pachycoma*.

1. *Monnina pterocarpa* R. & P. Syst. Veg. 174 (1798); Chodat in Bull. Herb. Boiss. 2: 168 (1894), in Bot. Jahrb. 42: 102 (1908).
Monnina angustifolia DC. Prodr. 1: 340 (1824).
Monnina chanduyensis Chodat in Bull. Herb. Boiss. 2: 167 (1894).
Monnina pterocarpa var. *exauriculata* Chodat in Bull. Soc. Bot. Genève II. 25: 202 (1934).

Annual, more or less herbaceous, 3–25 dm. high; stem 3.5–7 mm. in diameter, erect, terete, branched, the branches 8–78 cm. long, glabrescent; leaves linear (upper) or ovate-lanceolate (lower), 11–55 mm. long, 3–22 mm. wide, usually acute, rarely obtuse, glabrescent above, slightly pubescent beneath, entire, attenuate at base, the costa prominulous beneath, with 4 or 5 pairs of lateral veins; petioles 1–2.5 mm. long, pubescent; racemes more or less conical, acute, 8–11 mm. wide, simple, terminal, with a short peduncle, the axis 7–22 cm. long, finely pubescent, bracteate, the bracts filiform, 2–2.2 mm. long, deciduous, ciliate, 1-nerved, pubescent beneath; flowers 4–4.6 mm. long; pedicels 0.6–1 mm. long, glabrous; outer sepals free, lanceolate, concave, ciliate, acute, pubescent beneath, the two lower 1.6–2 mm. long, 0.8–1.2 mm. wide, 3-nerved, the upper one 2–2.5 mm. long, 0.9–1.4 mm. wide, 3–5-nerved; wings purple, 4–5 mm. long, 3–4 mm. wide, obovate, acute at base, 3–5-nerved, glabrous; keel yellow, 4–4.8 mm. long, 2.2–3.4 mm. wide, almost orbicular, plicate, glabrous within, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals elongate, pubescent within; stamens 8, the filaments 3–4 mm. long, united almost throughout, the apex acute, pubescent, the anthers emarginate; ovary elliptic, 1–1.4 mm. long, 0.6–0.8 mm. wide, glabrous; style 1.8–2.2 mm. long, geniculate near its base, glabrous, the apex 4–5 times as wide as the base, 2-auricled, the auricles usually conspicuous; stigma with 2 lobes, the lower more or less acute, the upper 2-tubercled; samara ovate, 3.5–8 mm. long, 3–7 mm. wide, gray-strigillose, becoming glabrescent, the wing 1–2.5 mm. wide, membranaceous, deeply emarginate at apex and base, the body rugose-reticulate. (PL. I, FIGS. 1–11.)

DISTRIBUTION: Northern and central parts of the Peruvian coast, between 20 and 2000 meters; also in the southwestern part of Ecuador, Province of Guayas.

ECUADOR: GUAYAS: Puntilla, Salinas, *Svenson* 11221 (US); Punta Centinela, *Svenson* 11390 (US); Chanduy, without date, *Spruce* 6398 (type photograph of *Monnina chanduyensis*, US). PERU: TUMBEZ: Caucás, Province of Tumbes, *Weberbauer* 7757 (isotypes of *Monnina pterocarpa* var. *exauriculata*, US, Ch); PIURA: Talara, *Johnston* 3512 (Ch, GH, US), *Haught* 7 (Ch, NY, US); Pariñas Valley, *Haught* 91 (Ch); Paita, *Pennell* 14812 (Ch, GH, NY, Ph, US); LIMA: Lima, 1838–42, *Wilkes Expedition*, without number (GH, US); near Lima, December 27, 1874–78, *Martinet* without number (Ch, US); Quives, *Pennell* 14298 (Ch, GH, Ph); near Viscas, *Pennell* 14467 (Ch, GH, NY, Ph, US); near Santa Eulalia, Province of Huarochiri, Chosica, *Goodspeed* 11308 (DA, GH, UC); above Chosica, *Mexia* 4007 (GH, M, UC);

vicinity of Chosica, *Rose & Rose 18545* (NY, US); Chosica, *Macbride 2874* (Ch, US), *Macbride & Featherstone 494* (Ch, US), *Grant 7393* (GH, US), *Soukup 2049* (US); DEPT. ?: Without locality and date, *Dombey 28* (Ch), *Gay* without number (fragments, US), *Pavón* without number (type photograph, US); "ex Lima," 1807, *Lagasca 54* (type photograph of *Monnina angustifolia*, US).

The original description of *Monnina angustifolia* indicates the characteristics of *M. pterocarpa*; moreover, the locality is cited as "circa Lima," and most of the specimens identified came from the Department of Lima. A. Gray, Bot. U. S. Expl. Exped. 1: 107 (1854), in his brief description of *M. angustifolia*, collected "between Lima and Yanga," states: "Perhaps not distinct from *M. pterocarpa*."

It was not possible to find important characters to separate *M. chanduyensis* from *M. pterocarpa*; on the contrary the photographs and the original descriptions of both seem to indicate that they are the same species. The species of Chodat was found in Chanduy (*Spruce 6398*), Province of Guayas, situated in the southwestern part of Ecuador; fortunately it was possible to see some specimens, *Svenson 11221* and *11390*, from localities near Chanduy. It has been possible also to examine some material from the northwestern part of Perú near the Province of Guayas. All of these specimens are essentially similar to the material from the Department of Lima. Chodat pointed out the similar qualities of the two species when he said: "Les feuilles, les petites stipules cornées, l'inflorescence et la grandeur des fleurs sont les mêmes." He established the differences in the shape of the samara, which in *M. pterocarpa* is regularly winged and symmetrical, while in *M. chanduyensis* it is irregular and asymmetrical. However, some specimens from Piura show the samara to be symmetrical and, on the contrary, material from Lima appears to have asymmetrical samaras. Therefore the writer prefers to combine the two species. It is desirable to indicate that the specimens *Pennell 14812* and *Svenson 11221* present an inconspicuous winged style; *Pennell 14467* shows small anthers and filaments with the upper part more or less free.

It is probable that Hooker made an error, in Bot. Mag. 58: t. 3122 (1831), in identifying a specimen from Lurín, Department of Lima, as *M. obtusifolia*, which is a species from Colombia. The specimen illustrated is the same as *M. pterocarpa*.

2. *Monnina amarella* Chodat in Bull. Soc. Bot. Genève II. 25: 200 (1934).

Annual, herbaceous, 0.6–8 dm. high; root 3–7 cm. long, 0.8–1.2 mm. in diameter, usually simple, perpendicular; stem erect, terete, branched, the branches 3–50 cm. long, finely pubescent; leaves oblanceolate or linear-lanceolate, 10–44 mm. long, 2–10 mm. wide, usually obtuse, sometimes emarginate, glabrescent, entire, attenuate at base, the costa prominent beneath with inconspicuous lateral veins; petioles 0.8–1.5 mm. long, glabrescent; racemes conical, acute, 7–9 mm. wide, simple, terminal, with a short peduncle, the axis 2–32 cm. long, slightly pubescent, bracteate, the bracts filiform, 1.5–1.8 mm. long, deciduous, glabrous, inconspicuous; flowers 3–3.8 mm. long; pedicels 0.5–0.7 mm. long, glabrous; outer sepals free, lanceolate, concave, glabrous, acute, the two lower 1–1.4 mm. long,

0.4–0.7 mm. wide, 1-nerved, the upper one 1.5–2.2 mm. long, 1–1.4 mm. wide, 3-nerved, rarely ciliate; wings purple, 2.8–3.2 mm. long, 2–2.2 mm. wide, obovate, acute at base, 3-nerved, glabrous; keel yellow, 3.5–3.8 mm. long, 1.8–2 mm. wide, orbicular, plicate, glabrous, acute at base, 4- or 5-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals elongate-spatulate, pubescent within; stamens 6, the filaments 2.8–3 mm. long, united, glabrous, the anthers sessile, emarginate; ovary elliptic, 1–1.8 mm. long, 0.8–1 mm. wide, glabrous; style 1.5–1.6 mm. long, conspicuously geniculate above the base, glabrous, 2-auricled; stigma with 2 lobes, the lower acute, the upper 1-tubercled; samara ovate, 3.5–5 mm. long, 3–3.8 mm. wide, strigillose, becoming glabrescent, the wing 0.8–1.2 mm. wide, membranaceous, deeply emarginate at apex and base, the body rugose-reticulate. (PL. I, FIGS. 12–22.)

DISTRIBUTION: In the central and southern Andes, Departments of Junín and Cuzco, between 2900 and 3600 meters.

PERU: JUNÍN: Between Viques and Ingahuasi, Mantaro Canyon, south of Huanayo, *Killip & Smith 22152* (US); Cuzco: Canyon Chicón, Prov. Urubamba, *Vargas 11061* (Ch, UC); Pampa de Anta, vicinity of Huarocando, *Herrera 3538* (Ch); colinas del Saxaihuamán, *Herrera 2388* (Ch); San Sebastián, *Pennell 13529* (TYPE Ch, ISOTYPES GH, NY, Ph, US); vicinity of Acomayo, Prov. Acomayo, *Vargas 491* (Ch); Cuzco, *Herrera 2393* (Ch); near Cuzco, *Herrera 681* (Ch, US); Ollantaytambo, *Cook & Gilbert 522* (US), *530* (US), *Pennell 13578* (Ph); Cuzco, July, 1923, *Herrera* without number (US); Saxaihuamán, *Pennell 13589* (Ph); "Urco," Calca, *Vargas 1774* (GH).

This species is close to *M. filifolia* Chodat, but it differs clearly from the latter in the oblanceolate leaves with an obtuse-emarginate apex; the axis is almost always short and the samara usually has a purple wing.

3. *Monnina filifolia* Chodat in Bull. Soc. Bot. Genève II. 25: 198 (1934).

Annual, herbaceous, 3–7.5 dm. high; root 6–9 cm. long, 1.2–3.5 mm. in diameter, simple or somewhat branched, perpendicular, sometimes curved; stem erect, terete, branched, the branches 10–50 cm. long, corymbose, slightly pubescent; leaves linear, 20–70 mm. long, 1.5–5 mm. wide, acuminate, sometimes acute, glabrescent, entire, attenuate at base, 1-nerved, sessile, the costa prominulous beneath; racemes conical, acute, 6–8 mm. wide, simple, terminal, pedunculate, the peduncle 14–35 mm. long, the axis 18–45 cm. long, finely pubescent, bracteate, the bracts filiform, 1.8–2.5 mm. long, deciduous, ciliate, 1-nerved; flowers 3–3.5 mm. long; pedicels 0.8–1 mm. long, glabrous; outer sepals free, lanceolate, concave, the two lower ones 1.2–1.8 mm. long, 0.5–0.6 mm. wide, glabrous, 1-nerved, acute, the upper one 2–2.2 mm. long, 1–1.2 mm. wide, ciliate, 3-nerved, acuminate; wings purple, 3.2–3.5 mm. long, 2–2.2 mm. wide, obovate, acute at base, 3-nerved, glabrous; keel yellow, 3.4–3.8 mm. long, 1.8–2 mm. wide, orbicular, plicate, glabrous, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals elongate-spatulate, conspicuously pubescent; stamens 6, the filaments 2–2.5 mm. long, united, pubescent at the apex, the anthers sessile; ovary elliptic, 1–1.5 mm. long, 0.5–0.6 mm. wide, glabrous; style 2–2.4 mm. long, geniculate at the middle, glabrous, with 2 conspicuous auricles; stigma more or less denticulate with 2 lobes, the lower acute, the upper 1-tubercled; samara ovate, 4–5.5 mm. long, 2.5–4.5 mm. wide, gray-strigillose, becoming glabrescent, the wing 0.8–1 mm. wide, membranaceous, deeply emarginate at apex and base, the body rugose-reticulate. (PL. I, FIGS. 23–33.)

DISTRIBUTION: Known only from the Department of Huancavelica in the general region of the central Andes, between 1900 and 2400 meters.

PERU: HUANCABELICA: Valley of the Mantaro river, below Colcabamba, Province of Tayacaja, *Weberbauer 6454* (TYPE Ch, ISOTYPES GH, NY, US); Mejorada, Prov. Huancavelica, *Stork & Horton 10909* (Ch, UC).

This plant is very close to *M. graminea* Chodat, from northern Perú (Cajamarca), but differs in the lower leaves being filiform, the samara being conspicuously puberulous, and the filaments of the stamens being united throughout. No herbarium material of *M. graminea* is available to the author, and the differences here noted are derived from the original description and a photograph of the type.

4. *Monnina graminea* Chodat in Bot. Jahrb. 42: 103 (1908).

Annual, herbaceous, 2–4 dm. high; root small, branched; stem erect, terete, simple or branched, the branches more or less pubescent, corymbose; leaves lanceolate or linear-lanceolate, 25–40 mm. long, 3–8 mm. wide, acute-mucronate, pubescent, entire, attenuate at base, the costa prominulous beneath; petioles short; stipules 1–1.5 mm. long, cylindric; racemes simple, terminal, the axis 10–20 cm. long, finely pubescent, bracteate, the bracts deciduous, inconspicuous; flowers 2–3 mm. long; pedicels 0.5 mm. long; outer sepals acute, glabrous; wings obovate, glabrous, cuneiform at base, the nerves fan-shaped; keel hemispherical, 3-lobed, the lobes obtuse; upper petals short, broad; staminal tube with hairs on the upper part, the filaments united, free in the upper part, glabrous; ovary elliptic, glabrous; style geniculate, 2-auricled; stigma with 2 lobes, the lower acute, the upper 1-tubercled; samara 2–3 mm. long, the wing glabrous, the body rugose-reticulate.

DISTRIBUTION: Confined to the northern part of the Peruvian Andes, Department of Cajamarca, at about 2200 meters.

PERU: CAJAMARCA: Below San Miguel, Prov. Hualgayoc, *Weberbauer 3919* (photograph of TYPE, US).

Material of this species has not been available, and the description given above is adapted from the original. It has also been possible to see the photograph of the type in the United States National Herbarium.

5. *Monnina herbacea* DC. Prodr. 1: 340 (1824).

Monnina polygonoides Chodat in Bull. Soc. Bot. Genève II. 25: 200 (1934).

Annual, herbaceous, 1–4.6 dm. high; root 5–7 cm. long, 1.5–2 mm. in diameter, curved, usually branched; stem almost erect, striate, branched at base, the branches 8–44 cm. long, more or less corymbose, pubescent; leaves usually lanceolate, rarely oblanceolate or elliptic, 8–40 mm. long, 3–12 mm. wide, obtuse, pubescent, becoming glabrescent, entire, attenuate at base, the costa prominulous beneath, with 5 or 6 pairs of lateral veins; petioles 0.6–1.5 mm. long, pubescent; racemes conical, acute, 7–8 mm. wide, simple, terminal, with a short peduncle, the axis 1.6–8 cm. long, finely pubescent, bracteate, the bracts filiform, 1.8–2.2 mm. long, deciduous, conspicuous, glabrous; flowers 3.5–4.2 mm. long; pedicels inconspicuous; outer sepals free, lanceolate, concave, ciliate, acute, the two lower 1.4–1.6 mm. long, 0.8–1 mm. wide, usually 3-nerved, sometimes 1-nerved, the upper one 2–2.4 mm. long, 1.2–1.4 mm. wide, 5-nerved; wings purple, 3.5–4.8 mm. long, 2.5–3.5 mm. wide, obovate, acute at base, 3-nerved,

ciliate; keel yellow, 3.8–4.8 mm. long, 2–2.5 mm. wide, orbicular, plicate, glabrous within, obtuse at base, 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger, ciliate; upper petals elongate-spatulate, pubescent within; stamens 8, the filaments 3–3.8 mm. long, united two-thirds their length, the free part 1–1.2 mm. long, glabrous, the anthers emarginate; ovary elliptic, 1–1.5 mm. long, 0.6–1 mm. wide, densely pubescent, the hairs rigid, ascendent, short; style 2–2.8 mm. long, geniculate above the base, glabrous, the apex thicker; stigma with 2 lobes, the lower acute, the upper 1-tubercled; fruit more or less samaroid, cordiform, 4–4.2 mm. long, 2.2–2.8 mm. wide, conspicuously pubescent, usually acute at apex, emarginate at base, the wing inconspicuous, the body rugose-reticulate. (PL. I, FIGS. 34–43.)

DISTRIBUTION: Indigenous in the central Andes, Departments of Huánuco and Junín, between 2100 and 2800 meters.

PERU: HUÁNUCO: Ambo, April 5, 1923, *Macbride 3181* (type of *M. polygonoides* Ch, isotypes GH, NY, US); JUNÍN: Huaríaca, *Macbride 3116* (Ch, GH, NY, US); DEPT. ? : Without locality and date, *Dombey 625* (fragments of authentic material from the Paris Herbarium, Ch, US); without locality, 1862, *Mathews* without number (NY); "ex Lima," 1807, *Lagasca 53* (photograph of TYPE, US).

Fortunately it was possible to see authentic material and also a photograph of the type of this species. The label of the type reads: "ex Lima," and the original description by de Candolle gives: "prope Lima"; nevertheless it seems probable that this material was collected in the Departments of Huánuco or Junín, regions visited several times by Ruiz, Pavón, and Dombey. On the other hand, the annual species common about Lima, *M. macrostachya* and *M. Weberbaueri*, are very different from the present species. It has been possible to see the type of *M. polygonoides* Chodat, and obviously it is equal to *M. herbacea*.

6. *Monnina ramosa* I. M. Johnston in Contrib. Gray Herb. 70: 77 (1924).

Annual, more or less herbaceous, 1.5–2 dm. high; root 1.5–2 mm. in diameter, branched, curved; stem erect, terete, conspicuously branched, the branches 4–12 cm. long, canescent-pubescent; leaves linear, 10–30 mm. long, 1–2.5 mm. wide, obtuse, rarely acute, finely pubescent, entire, revolute, attenuate at base, 1-nerved; petioles 0.5–1 mm. long, slightly pubescent; racemes conical, acute, 5–8 mm. wide, simple, terminal, with a short peduncle, the axis 5–10 cm. long, canescent-pubescent, bracteate, the bracts linear or lanceolate, 2.5–3 mm. long, 0.8–1 mm. wide, deciduous, ciliate, 1-nerved, pubescent beneath; flowers 3.5–4.8 mm. long; pedicels 0.5–0.7 mm. long, glabrous; outer sepals free, lanceolate, concave, ciliate, acute, 3-nerved, glabrescent beneath, the two lower ones 1.4–1.7 mm. long, 0.9–1 mm. wide, the upper one 2–2.2 mm. long, 1.2–1.3 mm. wide; wings white, 4–5 mm. long, 2.5–3 mm. wide, obovate, acute at base, 3-nerved, glabrous; keel yellowish, 4–5 mm. long, 2–3 mm. wide, orbicular, plicate, glabrous, obtuse at base, 3-nerved, 3-lobed, the middle lobe emarginate; upper petals elongate-spatulate, pubescent within; stamens 8, the filaments 3–3.5 mm. long, united, glabrous, the anthers subsessile, emarginate; ovary elliptic, 0.8–1 mm. long, 0.5–0.6 mm. wide, glabrous; style 1.5–2.5 mm. long, straight, becoming slightly geniculate in the upper part, glabrous, almost cylindric; stigma 3–4 times as wide as the base of style, with 2 lobes, the lower acute, the upper 1-tubercled, elongate, cylindric; samara

ovate, 3.5–4 mm. long, 3–3.5 mm. wide, gray-strigillose, the wing 0.8–1 mm. wide, membranaceous, deeply emarginate at apex and base, the body rugose-reticulate. (PL. II, FIGS. 1–10.)

DISTRIBUTION: This entity has been found in the southern part of the Department of Arequipa, at about 3300 meters.

PERU: AREQUIPA: On sandy pampa at 3300 m. alt. on south slope of Chachani Mountain near Arequipa, *Hinkley & Hinkley 13* (TYPE GH); Arequipa desert, August 21, 1925, *Cockerell* without number (US).

This species is related to *M. Weberbaueri* Chodat, from which it differs strongly in its leaves being linear with a revolute margin, the fruit being winged and puberulous, the lower sepals with 3 nerves, the keel glabrous, and the upper petals elongate. Furthermore the style is differently shaped.

7. *Monnina Macbridei* Chodat in Bull. Soc. Bot. Genève II. 25: 199 (1934).

Annual, herbaceous, 1–3.9 dm. high; root 3.5–8 cm. long, 0.8–1.4 mm. in diameter, usually simple, perpendicular; stem erect, terete, finely canescent-pubescent, simple, sometimes branched, the branches 4–16 cm. long; leaves linear or narrowly lanceolate, 14–45 mm. long, 1.5–5 mm. wide, acute, glabrescent, entire, attenuate at base, 1-nerved, the costa prominulous beneath; petioles 0.8–1.4 mm. long, glabrescent; racemes attenuate, acute, 5–7 mm. wide, simple, terminal, pedunculate, the peduncle 20–60 mm. long, the axis 2–14 cm. long, glabrescent, bracteate, the bracts filiform, 1.5–2 mm. long, deciduous, ciliate, 1-nerved, inconspicuous; flowers 3.5–4 mm. long, pedicels 0.5–0.6 mm. long, glabrous; outer sepals free, lanceolate, concave, glabrous, acute, the two lower ones 1.5–2 mm. long, 0.8–1 mm. wide, 1-nerved, the upper one 2–2.4 mm. long, 1–1.4 mm. wide, 3-nerved; wings purple, 4–4.2 mm. long, 2.4–2.6 mm. wide, obovate, acute at the base, 3- or 4-nerved, glabrous; keel yellow, 3.8–4 mm. long, 1.8–2 mm. wide, orbicular, plicate, obtuse-emarginate at the apex, glabrous, more or less acute at base, 3-nerved; upper petals elongate-spatulate, pubescent within; stamens 8, the filaments 2.8–3.2 mm. long, united, glabrous, the anthers subsessile; ovary elliptic, 0.8–1.5 mm. long, 0.6–0.8 mm. wide, glabrous; style 1.6–2.2 mm. long, straight, glabrous, almost cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, larger, papillose; samara ovate, 2.5–4.5 mm. long, 3–4 mm. wide, glabrous, the wing 0.8–1.2 mm. wide, membranaceous, deeply emarginate at apex and base, the body rugose-reticulate. (PL. II, FIGS. 11–20.)

DISTRIBUTION: Endemic in the southeastern Andes, Department of Arequipa, between 2100 and 3355 meters.

PERU: AREQUIPA: Chachani Mountain, north of Arequipa, *Hinkley & Hinkley 18* (GH); Arequipa, *Pennell 13167* (TYPE Ch, ISOTYPE GH, Ph); Tingo, *Pennell 13110* (Ch, GH, NY, Ph, US).

Very close to *M. ramosa* Johnston, from which it differs in the few-branched stem, the 1-nerved glabrous lower sepals, and the more or less cylindric style.

8. *Monnina arenicola* sp. nov.

Planta herbacea annua, radici gracili perpendiculari simplici 4–7 cm. longa; caulis teres breviter pilosus 0.3–1.6 dm. altus simplex vel plus minusve ramosus; folia herbacea lanceolata vel elliptica 10–25 mm. longa 4–9 mm. lata basim versus elongato-attenuata apice emarginata vel obtusa

glaberrima integerrima, nervo medio prominulo, inconspicue et breviter petiolata, petiolo 0.8–1.5 mm. longo glaberrimo; racemi simplices breves conici 5–6 mm. crassi, rhachi 3–8 cm. longa breviter pilosa, bracteis linearibus 1.5–2 mm. longis 0.4–0.5 mm. latis ciliatis deciduis; flores 2.8–3.2 mm. longi, pedicello 0.4–0.6 mm. longo glabro; sepala exteriora libera lanceolata acuta, duo inferiora 1.4–1.5 mm. longa 0.6–0.8 mm. lata plus minusve patentia glabra uninervia, sepalo superiore 1.6–1.8 mm. longo 1–1.2 mm. lato concavo ciliato 3-nervio; alae plus minusve albae 3–3.5 mm. longae 1.8–2 mm. latae obovatae glabrae basi acutae 3–5-nerviae; carina 3.2–3.5 mm. longa 1.5–1.6 mm. lata orbicularis plicata intus pilosa apice trilobata, lobo mediano acutiusculo, lobis lateralibus minoribus, basi plus minusve obtusiuscula 3-nervia, petalo superiore limbo breviter elongato extus glabro intus piloso; stamina 8 in fasciculis 2 disposita, filamentis 2.5–2.8 mm. longis connatis, antheris sessilibus; ovarium 1–1.2 mm. longum 0.5–0.7 mm. latum oblongum glabrum; stylus 1.2–1.6 mm. longus plus minusve geniculatus glaber cylindricus; stigma apice superiore bituberculatum apice inferiore acutum; samarae 4–5.5 mm. longae 3–4.8 mm. latae ellipticae reticulato-venosae canescentes strigillosae, alis 1–1.6 mm. latis membranaceis apice et basi conspicue emarginatis. (PL. II, FIGS. 21–30.)

DISTRIBUTION: Southern Perú, Department of Arequipa, in sandy plain near ocean, between 15 and 175 meters altitude.

PERU: AREQUIPA: East of Mollendo, sandy plain, *C. R. Worth & J. L. Morrison 15762* (DA, GH, M); south of Mollendo, sand dunes near ocean, November 17, 1935, *Mexia 4175* (TYPE Gray Herb., ISOTYPE M, UC).

Related to *M. macrostachya* R. & P. and also to *M. Weberbaueri* Chodat, differing from the first in the puberulous samara, the lower sepals, the glabrous wings and keel, and the stigma with the upper short lobe; from the second it is distinguished by its winged and puberulous fruit and the glabrous wings and keel. It is less closely related to *M. ramosa* Johnston, from which it differs in the lanceolate or elliptic leaves, the more or less simple stem, the lower sepals being 1-nerved, the keel being puberulous within, and the short upper petals.

9. *Monnina Weberbaueri* Chodat in Bot. Jahrb. 42: 102 (1908).

Annual, herbaceous, 1–4.8 dm. high; root 4–12 cm. long, 1–3 mm. in diameter, branched, curved; stem erect, terete, pubescent (hairs short, yellowish), ascendent, branched, the branches 7–26 cm. long; leaves usually lanceolate, rarely elliptic-spatulate, 12–46 mm. long, 6–26 mm. wide, obtuse, sometimes acute, glabrescent, entire, attenuate at base, the costa prominulous beneath with 6 or 7 pairs of lateral veins; petioles 1–2 mm. long, pubescent; racemes conical, acute, 8–12 mm. wide, simple, terminal, pedunculate, the peduncle 15–42 mm. long, the axis 2.5–16 cm. long, finely pubescent, bracteate, the bracts filiform, 1.2–1.6 mm. long, deciduous, ciliate, 1-nerved, inconspicuous; flowers 2.8–5 mm. long, the pedicels 0.5–0.6 mm. long, glabrescent; outer sepals free, lanceolate, concave, ciliate, acute, the two lower ones 1.4–1.6 mm. long, 0.4–0.5 mm. wide, 1-nerved, the upper one 2–2.2 mm. long, 0.6–0.8 mm. wide, 3-nerved, sometimes 1-nerved; wings purple, 2.8–4.2 mm. long, 1.8–2.8 mm. wide, obovate, acute at base, 3- or 4-nerved, ciliate; keel yellow, 3.4–5 mm. long, 1.5–2.8 mm. wide, orbicular, more or less plicate, pubescent within, acute at base.

3- or 4-nerved, 3-lobed, the middle lobe acute, larger, ciliate; upper petals short, pubescent within; stamens 8, the filaments 2.4–3 mm. long, united, glabrous, the anthers sessile, emarginate; ovary elliptic, 1–1.5 mm. long, 0.6–0.8 mm. wide, glabrous; style 1.5–2.8 mm. long, straight, becoming slightly geniculate near apex, glabrous, almost cylindric; stigma with 2 lobes, the lower acute, the upper 2-tubercled; drupe ovate, 1.8–2 mm. long, 1.4–1.5 mm. wide, glabrescent, rugose-reticulate. (PL. II, FIGS. 31–41.)

DISTRIBUTION: In "lomas" of central and southern Perú, Departments of Lima and Arequipa, between 20 and 550 meters.

PERU: LIMA: Lomas Pasamayo, south of Chancay, *Stork & Vargas 9351* (DA, GH, M, UC); lomas south of Lima, *Grant 7440* (GH, M, US); AREQUIPA: Mollendo, hillside directly back of the port, *I. M. Johnston 3551* (Ch, GH, US); Mollendo, *Hinchcock 22422* (US); Posco, between Mollendo and Arequipa, *Cook & Gilbert 47* (US); Mollendo, loma, *Weberbauer 1505* (TYPE photograph, Ch).

This may possibly be related to *M. macrostachya* R. & P., but it is distinguished by its fruit without wings and its slenderer and shorter racemes. Moreover, this species is endemic to the lomas near the ocean, while the species of Ruiz and Pavón comes from the sierra up to 1300 meters.

10. *Monnina macrostachya* R. & P. Syst. Veg. 173 (1798); Chodat in Bull. Herb. Boiss. 2: 168 (1894).

Polygala lanceolata Poir. Encycl. Méth. 5: 498 (1804).

Monnina lanceolata DC. Prodr. 1: 339 (1824).

Monnina macrostachya var. *pumila* A. Gray, Bot. U. S. Expl. Exped. 1: 107 (1854).

Monnina Weberbaueri var. *elongata* Chodat in Bot. Jahrb. 42: 103 (1908).

Monnina Weberbaueri var. *pachyantha* Chodat, l. c.

Monnina Weberbaueri var. *maxima* Chodat, l. c.

Annual, herbaceous, 1.5–5.5 dm. high; root 2.5–8 cm. long, 1–3 mm. in diameter, usually branched, conspicuously curved; stem erect, terete, branched, the branches 7–30 cm. long, ascending, pubescent, the hairs short, yellowish; leaves lanceolate, rarely more or less spatulate, 10–50 mm. long, 4–20 mm. wide, usually acuminate, sometimes obtuse, glabrescent, entire, attenuate at base, the costa prominulous beneath, with 5 or 6 pairs of lateral veins; petioles 1–2.5 mm. long, slightly pubescent; racemes conical, acute, 9–13 mm. wide, simple, terminal, pedunculate, the peduncle 20–95 mm. long, the axis 3–22 cm. long, finely pubescent, becoming glabrescent, bracteate, the bracts filiform, 1.8–2.5 mm. long, deciduous, ciliate, 1-nerved; flowers 4–6 mm. long; pedicels 0.8–1 mm. long, pubescent; outer sepals free, lanceolate, concave, ciliate, acuminate, the two lower ones 2–2.4 mm. long, 0.9–1 mm. wide, 1-nerved, rarely 3-nerved, the upper one 2.2–3 mm. long, 1.6–1.8 mm. wide, pubescent beneath, 3–5-nerved; wings purple, 4–5.4 mm. long, 3–3.6 mm. wide, obovate, acute at base, 3-nerved, ciliate; keel yellow, 4.4–6 mm. long, 2–2.8 mm. wide, orbicular, plicate, pubescent within, ciliate, acute at base, 3-nerved, 3-lobed, the middle lobe acute, larger; upper petals short, narrow, densely pubescent within; stamens 8, the filaments 3.4–4 mm. long, united, glabrous, the anthers sessile, emarginate; ovary elliptic, 0.8–1.4 mm. long, 0.5–0.8 mm. wide, glabrous; style 2–3 mm. long, straight, becoming geniculate near the apex, glabrous, almost cylindric, thicker in the upper part; stigma with 2 lobes, the lower acute, the upper 2-tubercled, acuminate, ciliate, larger; samara ovate, 3–5 mm. long, 2.5–4 mm. wide, usually

glabrescent, rarely gray-strigillose, the wing 0.6–1 mm. wide, membranaceous, deeply emarginate at apex and base, the body rugose-reticulate. (PL. III, FIGS. 1–10.)

DISTRIBUTION: The central and southern part of the Peruvian Andes, Departments of Huánuco, Lima, and Moquegua, between 1300 and 3200 meters.

PERU: HUÁNUCO: Mito, *Macbride & Featherstone 1548* (Ch); LIMA: Canta, *Pennell 14343* (Ch, GH, NY, Ph, US); Obrajillo, *Pennell 14372* (Ch, GH, NY, Ph, US); below Obrajillo, *Pennell 14436* (Ch, GH, NY, Ph, US); below Obrajillo, 1838–42, *Wilkes Expedition* without number (type of *Monnina macrostachya* var. *pumila* US); above Obrajillo, *Pennell 14373* (Ph); Obrajillo, 1838–42, *Wilkes Expedition* without number (GH); Yanahuanca, *Macbride & Featherstone 1168* (Ch, US); Puruchuca, *Collector ? 461* (GH); Cajatambo Province, *Stork 11451* (GH, UC); above Santa Eulalia, *Goodspeed 33016* (UC); quebrada southwest of Matucana, *Goodspeed 11332* (DA, GH, UC); Matucana, *Macbride & Featherstone 311* (Ch, US), 88 (Ch, US), *Stork & Horton 9143* (GH, UC); Valley of Lima, *Mathews 394* (GH); MOQUEGUA: Estuquiña, Province of Moquegua, *Weberbauer 7451* (Ch, US); Carumas, Province of Moquegua, *Weberbauer 7301* (Ch, US); DEPT. ? : without locality, *Mathews 1001* (NY); without locality, 1838–42, *Wilkes Expedition* without number (NY, US); without locality, without date, *Dombey* without number (probably fragments of authentic material of *Polygala lanceolata*, Ch); without locality, without date, *Collector ?* without number (type photograph of *Polygala lanceolata*, US).

The description given by Ruiz & Pavón and also the additional description by Chodat of *M. macrostachya* indicate the characters of this species. According to Ruiz & Pavón the locality of the type is "Cercado et Chancay," situated in the eastern and northern parts of Lima respectively. The majority of the specimens of this species have been collected in this vicinity.

There is no available authentic material of *Polygala lanceolata*. However, it seems that the photograph of the type and the brief original description correspond to *M. macrostachya*.

Asa Gray described *M. macrostachya* var. *pumila* from material collected "below Obrajillo" near Lima; the type appears to the writer to be essentially identical with that of the species.

The three varieties of *M. Weberbaueri* cited above, proposed by Chodat, are based on the following material: var. *elongata* on *Weberbauer 2724* from Ocros, Province of Cajatambo; var. *pachyantha* on *Weberbauer 185* from Matucana; and var. *maxima* on *Weberbauer 3125* from Hacienda Cajabamba, between Samanco and Caraz. These localities are situated in the Andean region at elevations up to 1300 meters. All the available material of *M. macrostachya* comes from this region or from the sierra, while the related *M. Weberbaueri* and *M. arenicola* are strictly confined to the "lomas" and sand-dunes near the ocean. Therefore it is to be presumed that the varieties proposed by Chodat are synonymous with *M. macrostachya*.

11. *Monnina longibracteata* Chodat in Bull. Herb. Boiss. 3: 130 (1895).

Frutescent, branched, the branches 5 mm. in diameter, decurrent, striate, more or less glabrescent; leaves lanceolate or elliptic, sometimes linear-lanceolate, 80–90 mm. long, 25–27 mm. wide, usually acute, rarely acuminate, slightly pubescent, becoming glabrescent, entire, attenuate at base, the costa prominulous beneath, with 8 or 9 pairs of lateral veins;

petioles 4–8 mm. long, pubescent; racemes elongate, almost acute, 8–11 mm. wide, simple, terminal, the axis to 15 cm. long, pubescent in the upper part, bracteate, the bracts conspicuously filiform, 5–6.5 mm. long, 0.8–1 mm. wide, glabrescent, 1-nerved; flowers 3.6–5 mm. long; pedicels 1.2–1.5 mm. long, finely pubescent; outer sepals lanceolate, acute, glabrous, the two lower ones 2.4–2.6 mm. long, 0.6–0.8 mm. wide, almost $\frac{1}{2}$ united, 1-nerved, the nerve conspicuous, the upper sepal 2.6–3 mm. long, 1.2–1.4 mm. wide, 3-nerved; wings 4–4.2 mm. long, 3.6–3.8 mm. wide, obovate, obtuse at base, 3- or 4-nerved, glabrescent beneath, sometimes with a few hairs on the lower part; keel 3–3.2 mm. long, 2–2.2 mm. wide, orbicular, plicate, pubescent within, glabrous on margin, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate; upper petals elongate, attenuate, pubescent within; stamens 8, the filaments 2.8–3 mm. long, almost entirely united, the free part 0.5–0.7 mm. long; ovary elliptic, 0.8–1 mm. long, 0.5–0.6 mm. wide, glabrous; style 2–2.2 mm. long, geniculate above the base, glabrous, cylindric; stigma with 2 lobes, the lower more or less obtuse, the upper 1-tubercled, the tubercle papillose; fruit unknown. (PL. III, FIGS. 11–17.)

DISTRIBUTION: Probably found in the northern part of Perú, Department of Amazonas.

PERU: "Habitat in America australi," 1835, *Mathews 2075* (fragments and photograph of the TYPE, US).

This species has elongated terminal or axillary racemes, with the flowers not crowded and the bracts conspicuously linear with an involute apex.

The material of the type was probably collected in the Department of Amazonas, northern Perú, where Mathews lived for several years.

11a. *Monnina longibracteata* var. *ainensis* Chodat in Bull. Soc. Bot. Genève II. 25: 222 (1934).

This variety differs from the typical form in the following characters: acuminate, larger leaves (42–170 mm. long, 11–65 mm. wide); axis of inflorescence to 33 cm. long, the outer sepals ciliate, the lower 3-nerved, the wings strongly pubescent beneath; upper petals densely pubescent; ovary more or less pubescent. (PL. III, FIGS. 18–25.)

PERU: AYACUCHO: Aina, between Huanta and Apurímac River, *Killip & Smith 23188* (TYPE Ch, ISOTYPE NY).

12. *Monnina huallagensis* Chodat in Bull. Soc. Bot. Genève II. 25: 223 (1934).

Plant frutescent, branched, the branches glabrous, decurrent; leaves lanceolate, 38–125 mm. long, 7–38 mm. wide, acuminate, rarely more or less acute, glabrescent, entire, attenuate at base, the costa prominulous beneath, with 7 or 8 pairs of lateral veins; petioles 2–4 mm. long, pubescent, stipulate, the stipules 1–1.4 mm. long, acute, pubescent; racemes elongate, acuminate, 9–11 mm. wide, simple, terminal, pedunculate, the peduncle 16–70 mm. long, the axis 15–30 cm. long, glabrous, bracteate, the bracts conspicuously linear, 3–5 mm. long, 0.6–1 mm. wide, glabrous, 1-nerved; flowers 4–4.8 mm. long; pedicels 1.4–2 mm. long, glabrous; outer sepals lanceolate, acute, the two lower ones 1.8–2 mm. long, 0.6–1 mm. wide, more or less $\frac{2}{3}$ united, 1-nerved, glabrous, sometimes ciliate, the upper one 2.4–2.6 mm. long, 1.2–1.3 mm. wide, 3-nerved, ciliate, glabrous

beneath; wings 4–4.6 mm. long, 3.8–4 mm. wide, obovate, obtuse at base, 3-nerved, more or less pubescent beneath; keel 3.5–4.2 mm. long, 2.4–2.6 mm. wide, orbicular, plicate, pubescent within, glabrous on margin, obtuse at base, 3–5-nerved, 3-lobed, the middle lobe obtuse-emarginate; upper petals elongate-spatulate, pubescent within; stamens 8, the filaments 2.8–3.2 mm. long, almost united entirely, the free part 0.6–1 mm. long, pubescent, the anthers mucronate; ovary elliptic, 1.2–1.5 mm. long, 0.8–1 mm. wide, glabrous; style 2.2–2.5 mm. long, straight, becoming geniculate, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled; drupe ovate, 4–6 mm. long, 2.5–3 mm. wide, glabrous, conspicuously reticulate. (PL. III, FIGS. 26–33.)

DISTRIBUTION: Probably limited to the Department of Huánuco, central Perú.

PERU: HUÁNUCO: Pampayacu, *Kanehira* 290 (GH); DEPT. ? : Huallaga, 1600 meters, *Weberbauer* 6805 (TYPE Ch, ISOTYPES GH, NY, US).

Very close to *M. longibracteata* Chodat, from which it differs in the rigid bracts, the acuminate leaves, the stamens with the free upper part of the filaments pubescent, and the mucronate anthers. It is also related to *M. macrosepala* Chodat, from which it is distinguished by its larger inflorescence-axis (to 30 cm. long), the flowers not crowded, the leaves with 7 or 8 pairs of lateral veins, the outer sepals smaller, 1-nerved, the mucronate anthers, etc.

12a. *Monnina huallagensis* var. *pachyphylla* Chodat, l. c.

Differs from the typical form in the stronger branches, the glabrous leaves with reticulate nerves, and the axis of the inflorescence being conspicuously shorter. (PL. III, FIG. 34.)

PERU: HUÁNUCO: Cueva Grande, estación near Pozuzo, alt. 3500 meters, *Macbride* 4786 (TYPE US, ISOTYPE GH).

13. *Monnina glabrifolia* sp. nov.

Frutex ad 20 dm. altus, ramis 2–7 mm. crassis glabris tenuiter striatis; folia lanceolata 4.5–14 cm. longa, 2–6 cm. lata basim versus elongato-attenuata apice acuta vel breviter acuminata integerrima utrinque glabra, nervo medio prominulo, nervis lateralibus 9 vel 10, petiolo 2–3 mm. longo glabro; racemi simplices plus minusve conici 5–7 mm. crassi, rhachi 3.5–23 cm. longa breviter puberula striata, pedunculati, pedunculo 1.5–4.5 cm. longo, bracteis lanceolatis 4.5–6.5 mm. longis, 1.5–2 mm. latis puberulis uninerviis; flores 4.2–4.6 mm. longi, pedicello 1.2–1.8 mm. longo plus minusve puberulo; sepala exteriora concava ciliata lanceolata subtus puberula, duo inferiora 2.6–3 mm. longa 1.3–1.5 mm. lata obtusa ad $\frac{2}{3}$ connata 5-nervia, sepalo superiore minore 2–2.2 mm. longo 1.2–1.4 mm. lato acutiusculo 7-nervio; alae 4.8–5 mm. longae 3.2–3.4 mm. latae obovatae basi plus minusve obtusae ciliatae 3- vel 4-nerviae subtus pubescentes; carina 5–5.2 mm. longa 3–3.4 mm. lata orbiculari-obovata glabra apice trilobata, lobo mediano emarginato, lobis lateralibus obtusiusculis, basi obtusiuscula 3- vel 4-nervia breviter ciliata, petalo superiore breviter elongato pubescente; stamina 8, filamentis 3.5–3.8 mm. longis, antheris subsessilibus vel filamentorum parte libera 0.6–1.2 mm. longa glabra; ovarium 1.5–1.6 mm. longum 1.2–1.3 mm. latum oblongum dense pubescens; stylus 2–2.2 mm. longus geniculatus glaber cylindricus; stigma apice superiore tuberculatum papillosum, apice inferiore acutum; drupae corda-

tae 4.5–6 mm. longae 3.8–5 mm. latae breviter alatae conspicue pubescentes reticulato-venosae. (PL. IV, FIGS. 1–9.)

DISTRIBUTION: Known only from the type collection.

PERU: PUNO: Trail from Santo Domingo to Chabuca mine, Province Carabaya, May 30–June 1, 1942, alt. 1900 meters, *Metcalf 30661* (TYPE UC 690169, ISOTYPE US).

The new species is related to *M. andina* Chodat, but has acuminate and larger leaves (more or less 3 times larger); the racemes with crowded and larger bracts also distinguish it from the latter species. It is also close to *M. Lechleriana* Chodat, from which it sharply differs in the terminal and simple racemes, the pubescent ovary, etc.

14. *Monnina menthoides* Chodat in Bull. Soc. Bot. Genève II. 25: 219 (1934).

Frutescent, branched, the branches 2.5–3 mm. in diameter, canescent-tomentose; leaves lanceolate, 30–40 mm. long, 8–9 mm. wide, acute, sometimes mucronate, pubescent above, densely pubescent beneath, sinuate-denticulate, attenuate at base; petioles 3 mm. long, hirsute; racemes elongate, simple, terminal, 6–8 cm. long, the axis 6–12 cm. long, densely hirsute, bracteate, the bracts linear, pubescent beneath; flowers 5 mm. long; pedicels 1 mm. long, pubescent; outer sepals lanceolate-triangular, ciliate, the two lower united; wings more or less orbicular, slightly unguiculate, ciliate; upper petals linear-spatulate, pubescent; filaments of stamens more or less united; ovary pubescent; style geniculate; samara cordate, 5 mm. long, 5 mm. wide, pubescent, the apex slightly emarginate, the body canescent, reticulate.

DISTRIBUTION: In the southeastern part of Perú, Department of Cuzco.

PERU: Cuzco: Marcapata, Province Quispicanchis, *Weberbauer 7786* (not seen).

Material of the present species has not been available, and therefore the description given above is adapted from the original. It appears to be closely related to *M. andina* Chodat and *M. cyanea* Chodat. It differs from *M. andina* in the tomentose branches and the lanceolate, hirsute, sinuate-dentate leaves with an acute-mucronate apex; it is distinguished from *M. cyanea* chiefly by the sinuate-dentate leaves and the lower sepals being united.

15. *Monnina andina* Chodat in Bot. Jahrb. 42: 104 (1908).

Plant frutescent, about 10 dm. high, branched, the branches nodose; leaves lanceolate-elliptic, 25–45 mm. long, 9–15 mm. wide, obtuse, entire, slightly revolute, attenuate at base, the costa prominulous beneath, pubescent; petioles short; stipules to 0.5 mm. long; racemes thin, simple, terminal, 5–10 cm. long, glabrescent, the axis bracteate, the bracts conspicuous, linear; flowers 2–3 mm. long; outer sepals ovate, obtuse, ciliate, the two lower united; wings orbicular, oblique, attenuate at base, ciliate; upper petals narrow, the apex incurvate; androecium pubescent at the apex, the filaments almost entirely united, the anthers subsessile; ovary oblong, pubescent, the style straight, becoming geniculate; stigma with 2 lobes, the lower more or less acute, the upper globose, sessile; fruit ovate-cordiform, 3–4 mm. long, slightly winged, pubescent, emarginate at apex.

DISTRIBUTION: Known only in the southeastern part of the Peruvian Andes, Department of Puno, between 1800 and 2200 meters altitude.

PERU: PUNO: Between tambo Yuncacoya and tambo Cachicachi, between Sandia and Chunchusmayo, *Weberbauer 1146* (photograph of TYPE, US).

Although there is no available material of this species, the photograph of the type shows some conspicuous characters, such as the following: thin and glabrous branches, short and thin racemes, and the axis of the inflorescence with linear bracts. Some measurements given above were adapted from the photograph.

16. *Monnina marginata* Presl, Reliq. Haenk. 2: 102 (1827).

Monnina laurifolia Chodat in Bull. Soc. Bot. Genève II. 25: 208 (1934).

Monnina petiolaris Chodat, l. c. 214.

Monnina petiolaris var. *elliptica* Chodat, l. c. 215.

Slender tree, 15–45 dm. high, the crown to 10 dm. in diameter, strongly branched, the branches striate, glabrous, to 1 cm. in diameter; leaves lanceolate, 25–100 mm. long, 11–28 mm. wide, acute, rarely more or less obtuse, glabrescent above, slightly pubescent beneath, entire, attenuate at base, the costa prominulous beneath, with 6–8 pairs of lateral veins; petioles 2–10 mm. long, articulate, almost cylindric, finely pubescent, becoming glabrescent; racemes conical, acute, 8–9 mm. wide, shortly pedunculate, simple, terminal, conspicuously corymbose, the axis 2–3 cm. long, finely pubescent, striate, bracteate, the bracts triangular, 1–1.2 mm. long, 1.1–1.3 mm. wide, deciduous, inconspicuous; flowers 4–5 mm. long; pedicels 0.5–1.8 mm. long, slightly pubescent; outer sepals ovate-triangular, ciliate, obtuse, pubescent beneath, the two lower ones 1.8–2 mm. long, 1.2–1.4 mm. wide, $\frac{1}{2}$ united, 1-nerved, the upper one 2–2.4 mm. long, 1.4–1.6 mm. wide, 3-nerved; wings deep blue, 4.5–5.5 mm. long, 3.5–4.4 mm. wide, obovate, more or less obtuse at base, 5-nerved, pubescent beneath, ciliate at base; keel yellow, 4.2–5.5 mm. long, 2.5–3.2 mm. wide, orbicular, plicate, pubescent within, glabrous at margin, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals spatulate, densely pubescent; stamens 8, the filaments 2.8–3.5 mm. long, united to near the apex, the free part 1–1.2 mm. long, glabrous; ovary elliptic, 1.5–1.6 mm. long, 1–1.1 mm. wide, conspicuously pubescent, the upper longitudinal line with rigid larger hairs; style 2–3 mm. long, geniculate in the middle part, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, papillose; drupe ovate, 4–6 mm. long, 2–3 mm. wide, glabrous, reticulate. (Pl. IV, FIGS. 10–17.)

DISTRIBUTION: Endemic in central Perú, Department of Huánuco, between 2800 and 3900 meters altitude.

PERU: HUÁNUCO: Pampayacu to Huánuco, *Kanekira* 190 (A, Ch); Carpish, *Stork & Horton* 9908 (Ch, DA, M, UC); Tambo de Vaca, *Macbride* 4908 (type of *M. petiolaris* var. *elliptica*, Ch); Pano, *Macbride* 3620 (type of *M. petiolaris*, Ch, iso-types A, NY, US); 6 miles south of Mito, *Macbride & Featherstone* 1855 (type of *M. laurifolia*, Ch).

This plant is closely related to *M. conferta* R. & P., but differs in the lanceolate and larger leaves, the racemes being conspicuously corymbose, the lower sepals 1-nerved, the wings pubescent beneath, and the ovary more or less pubescent; finally, this is a tree.

In Bull. Herb. Boiss. 4: 253 (1896), Chodat considers *M. marginata* as a doubtful species. However, the original description is quite adequate. Moreover, Presl stated that this species was found, "in montibus huanocensibus Peruviae." Therefore, in the opinion of the writer, the species of Presl must be maintained.

17. *Monnina pseudo-salicifolia* sp. nov.

Frutex ramosus, ramis 17–26 cm. longis ad 2–4 mm. crassis lignosis tenuiter striatis glabrescentibus; folia elliptica vel plus minusve lanceolata 3.5–9.2 cm. longa 1.8–3.6 cm. lata, basim versus elongato-attenuata, apice acuta vel obtuso-emarginata, supra glabrescentia subtus breviter pubescentia, integerrima, nervo medio prominulo, nervis lateralibus 7 vel 8, petiolo 1–2 mm. longo pubescente basi plus minusve articulato et circumscripto; racemi simplices breves conici 6–8 mm. crassi, rhachi 30–55 mm. longa puberula striata, tenuiter pedunculati, pedunculo 18–20 mm. longo, bracteis lanceolatis 2–2.2 mm. longis 1–1.2 mm. latis subtus minutissime puberulis uninerviis; flores 4.6–5.5 mm. longi, pedicello 1.8–2 mm. longo puberulo; sepalia exteriora lanceolata ciliata concava subtus puberula obtusa, duo inferiora 2.3–2.6 mm. longa 1.3–1.5 mm. lata breviter connata 3-nervia, sepalio superiore 3–3.2 mm. longo 1.6–1.8 mm. lato 5-nervio; alae 5–6 mm. longae 4–4.8 mm. latae obovatae basi plus minusve acutae, breviter ciliatae vel eciliatae, 3-nerviae, subtus glabrae, supra basi puberulae; carina 4.5–5 mm. longa 3–3.2 mm. lata orbicularis obovata glabra apice trilobata, lobo mediano obtuso emarginato, lobis lateralibus obtusiusculis, basi plus minusve obtusa trinervia breviter ciliata, petalo superiore elongato-spathulato utrinque conspicue puberulo; stamina 8, filamentis 4–4.4 mm. longis, antheris subsessilibus vel filamentorum parte libera 0.6–1.2 mm. longa glabra; ovarium 1.2–1.5 mm. longum 0.6–0.8 mm. latum oblongum pubescens vel plus minusve glabrescens; stylus 2.5–3 mm. longus brevis erectus deinde geniculatus et subhorizontalis glaber cylindricus; stigma apice superiore tuberculatum papillosum apice inferiore plus minusve acutum; fructus ignotus. (PL. IV, FIGS. 18–25.)

DISTRIBUTION: In the sierra in the northern part of Peru, Department of Piura, at about 3000 meters altitude.

PERU: PIURA: Above Palambla, Province of Huancabamba, April, 1912, *Weberbauer* 6055 (TYPE US 1473497, ISOTYPES Ch, GH).

This species is near *M. marginata* Presl, from central Perú, but it is less robust, the leaves are more or less elliptic, the lower sepals are 3-nerved and slightly united, the upper sepal is 5-nerved, the wings are glabrous beneath but pubescent within, the keel is glabrous within, and the upper petals are densely pubescent. Superficially the new species closely resembles *M. salicifolia* R. & P., from which it differs in its united lower sepals, pubescent ovary, etc.

18. *Monnina macrosepala* Chodat in Bull. Soc. Bot. Genève II. 25: 218 (1934).

Frutescent, 6–24 dm. high, branched, the branches terete, 6 mm. in diameter, slightly pubescent, becoming glabrescent; leaves linear-lanceolate, 55–125 mm. long, 12–28 mm. wide, acuminate, sometimes acute, glabrescent, entire, attenuate at base, the costa prominent beneath, with 9 or 10 pairs of lateral veins; petioles 2–4 mm. long, pubescent; racemes cylindric, acute, 4–5 mm. wide, with a short peduncle, simple, terminal, the axis 6–15 cm. long, pubescent, striate, bracteate, the bracts linear, 3–6 mm. long, lax, conspicuous, deciduous, ciliate, 1-nerved; flowers 4.2–4.8 mm. long; pedicels 1–1.2 mm. long, glabrescent; outer sepals lanceolate, acute, glabrous beneath, the two lower ones 4.4–4.6 mm. long, 3.8–4 mm. wide, $\frac{2}{3}$ united, 5-nerved, ciliate, the upper one 4.5–5 mm.

long, 3–3.2 mm. wide, rarely ciliate, sometimes obtuse, 7–9-nerved; wings 4.6–5 mm. long, 3.6–4 mm. wide, obovate, more or less acute at base, 4- or 5-nerved, pubescent beneath; keel 4–4.5 mm. long, 3–3.2 mm. wide, almost orbicular, plicate, pubescent within, obtuse at base, 4- or 5-nerved, 3-lobed, the middle lobe obtuse-emarginate; upper petals elongate-spatulate, pubescent; stamens 8, the filaments 2.8–3 mm. long, almost entirely united, the free part pubescent, the anthers more or less mucronate; ovary elliptic, 1.4–1.6 mm. long, 0.6–0.7 mm. wide, glabrous; style 2–2.4 mm. long, geniculate above the base, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, papillose; fruit unknown. (PL. IV, FIGS. 26–33.)

DISTRIBUTION: Endemic in the “ceja de montaña,” Department of Junín, central Perú, between 900 and 2400 meters.

PERU: JUNÍN: Chanchamayo Valley, *C. Schunke* 487 (TYPE Ch); Huacapistana, *Killip & Smith* 24515 (US); San Ramón, *Killip & Smith* 24754 (US), 24765 (US).

The species is distinguished by large sepals. It resembles *M. longibracteata* Chodat, but is quite distinct in its shorter inflorescence and the absence of filiform bracts.

18a. *Monnina macrosepala* var. *latifolia* Chodat, op. cit. 219.

The variety differs from the typical form in its broad leaves (to 64 cm. wide), longer petioles (4–6 mm. long), smaller upper sepal (to 4.4 mm. long), and the orange keel.

PERU: JUNÍN: La Merced, along sunny stream, 600 meters altitude, *Macbride* 5410 (TYPE Ch).

19. *Monnina Vitis-Idaea* Chodat, Bull. Soc. Bot. Genève II. 25: 208 (1934).

Monnina arbuscula Chodat, op. cit. 222.

Frutescent, to 3 dm. high, stem erect, woody, 5–7 mm. in diameter, glabrous, nodose, branched, the branches 9–18 cm. long, decurrent, corymbose, glabrescent; leaves usually elliptic, rarely ovate, 10–20 mm. long, 5–8 mm. wide, obtuse, glabrescent, entire, slightly revolute, the costa prominulous beneath, with 4 or 5 pairs of inconspicuous lateral veins; petioles 1–1.5 mm. long, cylindric, more or less pubescent; racemes conical, acute, 6–8 mm. wide, with a short peduncle, simple, terminal, the axis 1.2–1.6 cm. long, finely pubescent, bracteate, the bracts triangular, inconspicuous, deciduous; flowers 4–4.2 mm. long; pedicels 0.6–0.8 mm. long, finely pubescent; outer sepals ovate-triangular, ciliate, glabrous beneath, the two lower ones 1.8–2 mm. long, 1–1.2 mm. wide, $\frac{1}{2}$ united, obtuse, conspicuously 1-nerved, the upper one 2–2.4 mm. long, 2–2.2 mm. wide, acute, 5-nerved; wings 4–5 mm. long, 3.6–3.8 mm. wide, obovate, obtuse at base, pubescent within, glabrous beneath, 3- or 4-nerved, the nerves conspicuous; keel 3.5–4 mm. long, 2.5–3 mm. wide, more or less orbicular, plicate, glabrous, obtuse at base, 3- or 4-nerved, 2-lobed, the lobes obtuse; upper petals conspicuously elongate-spatulate, pubescent; stamens 8, the filaments 3–3.2 mm. long, almost entirely united, the anthers mucronate; ovary ovate-truncate, 1–1.2 mm. long, 0.6–0.8 mm. wide, glabrous; style 1.8–2 mm. long, geniculate, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, papillose; drupe ovate, 5–8 mm. long, 2–3.6 mm. wide, glabrous, reticulate. (PL. V, FIGS. 1–8.)

DISTRIBUTION: Northern Perú, Department of Piura, at about 3500 meters altitude.

PERU: PIURA: Cordillera east of Huancabamba, Province of Huancabamba, *Weberbauer 6129* (TYPE GH, and type of *M. arbuscula*, Ch).

This glabrous plant has a strong woody and nodose stem. It is a distinct species characterized by its small and coriaceous leaves, its sepals with conspicuous nerves, its keel with 2 lobes rather than 3, and finally by its mucronate anthers.

A duplicate of the type of *M. Vitis-Idaea* was inadvertently described by Chodat as *M. arbuscula*. *Weberbauer's* collection was definitely not a mixture.

20. *Monnina conferta* R. & P. Syst. Veg. 173 (1798).

Monnina myrtilloides DC. Prodr. 1: 339 (1824).

Shrub, 5–18 dm. high, the stem erect, more or less pubescent, becoming glabrescent, branched, the branches 8–29 cm. long, striate, corymbose; leaves usually elliptic, rarely more or less lanceolate, 11–45 mm. long, 5–14 mm. wide, obtuse, glabrescent above, slightly pubescent beneath, entire, sometimes revolute, the costa prominulous beneath, with 4 or 5 pairs of inconspicuous lateral veins; petioles 1.5–2.4 mm. long, concave above, convex beneath, pubescent; racemes conical, acute, 8–10 mm. wide, simple, terminal, pedunculate, the peduncle 6–11 mm. long, the axis 3–10 cm. long, striate, pubescent, bracteate, the bracts triangular, concave, 1.2–1.4 mm. long, 1–1.2 mm. wide, pubescent beneath, acute, ciliate, 1-nerved, inconspicuous; flowers 5–6 mm. long; pedicels 1–1.2 mm. long, finely pubescent; outer sepals ovate-triangular, obtuse, ciliate, pubescent beneath, the two lower ones 2–2.6 mm. long, 1.4–1.8 mm. wide, almost $\frac{2}{3}$ united, 3-nerved, the upper one 2.8–3 mm. long, 1.8–2.4 mm. wide, 5–7-nerved; wings deep blue, 5.2–6 mm. long, 4.4–5.5 mm. wide, obovate, obtuse at base, 4- or 5-nerved, ciliate, usually glabrous beneath, rarely slightly pubescent, sometimes pubescent within; keel yellow, 5.2–6.5 mm. long, 3.4–4 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 4- or 5-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals short, narrow, pubescent; stamens 8, the filaments 3.8–4.2 mm. long, almost entirely united, the free part 0.6–1.4 mm. long; ovary elliptic, 1.2–2 mm. long, 0.8–1.4 mm. wide, glabrous; style 2.8–3.6 mm. long, geniculate in the middle part, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, papillose; drupe elliptic, 4.5–7 mm. long, 2–4 mm. wide, glabrous, reticulate. (PL. V, FIGS. 9–16.)

DISTRIBUTION: In the sierra from northern Perú, Department of Cajamarca, to southern Perú, Department of Ayacucho, between 2500 and 3600 meters altitude.

PERU: CAJAMARCA: Pass south of Conchán, Province of Chota, *Stork & Horton 10064* (Ch, UC); LA LIBERTAD: Cachicadan, Province Santiago de Chuco, *Stork & Horton 9955* (Ch, UC); HUÁNUCO: Between Huánuco and Pampayacu, *Kanehira 244* (A, Ch); Mito, *Macbride & Featherstone 1514* (Ch, US); "Tambo nuevo," *Pavón* without number (photograph of authentic material, GH); JUNÍN: Ocopa, *Killip & Smith 21977* (Ch, NY, US); near Huancayo, *Killip & Smith 23348* (Ch, NY, US), *Soukup 1982* (US); HUANCAVELICA: Quebrada south of Salcabamba, Province Taya-caja, *Stork & Horton 10298* (Ch, UC); AYACUCHO: Above Yanamonte, between Tambo and Apurimac, *Weberbauer 5659* (Ch, GH, US); Totorabamba, Province Huamanga, *Weberbauer 5488* (Ch, GH, US); DEPT. ?: Without locality and date, *Dombey* without number (fragments of authentic material, Ch, US); without locality, 1807, *Lagasca 56* (photograph of the TYPE, US).

This species has corymbose branches and simple and terminal racemes.

The fragments of authentic material from the Herbarium in Paris and also the photographs fit well the specimens the author refers to this species.

De Candolle described *M. myrtilloides* very briefly. Apparently it is equal to *M. conferta*; Chodat, in Bot. Jahrb. 42: 102 (1908), places it as a synonym.

The specimen *Weberbauer 5488* shows a certain pubescence beneath the wings.

21. *Monnina stipulata* Chodat in Bull. Herb. Boiss. 2: 170 (1894).

Frutescent, to 10 dm. high, branched, the branches 4–7 mm. in diameter, striate, densely pubescent (hairs yellow, lax), becoming more or less glabrescent on the lower part; leaves ovate-elliptic, 35–90 mm. long, 15–40 mm. wide, obtuse, sometimes almost acute, finely pubescent above, becoming glabrescent, conspicuously pubescent beneath, canescent, entire, strongly revolute, the costa prominulous beneath, with 7 or 8 pairs of lateral veins; petioles 3–6 mm. long, densely pubescent, articulate, cylindrical; racemes conical, acute, 8–27 mm. long, 7–9 mm. wide, simple, axillary or terminal, subsessile, the axis 1.4–3 cm. long, densely pubescent, bracteate, the bracts triangular, concave, 1.8–2.5 mm. long, 1.6–2 mm. wide, pubescent beneath, acute, ciliate, 1-nerved; flowers 4–6 mm. long; pedicels 0.6–0.8 mm. long, pubescent; outer sepals ovate-triangular, ciliate, obtuse, pubescent beneath, the two lower ones 2–2.2 mm. long, 2.4–3 mm. wide, $\frac{2}{3}$ united, 5-nerved, the upper one 2.8–3 mm. long, 2.2–2.4 mm. wide, 7-nerved; wings 5–6 mm. long, 4–5.2 mm. wide, obovate, obtuse at base, 4- or 5-nerved, slightly pubescent beneath, ciliate at base, glabrous within; keel 5.5–7 mm. long, 4–4.4 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 7- or 8-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals more or less spatulate, pubescent; stamens 8, the filaments 4–4.4 mm. long, almost entirely united, the free part 1–1.4 mm. long, the anthers mucronate; ovary elliptic, 1.6–2.2 mm. long, 1–1.6 mm. wide, glabrous, rarely with a few hairs on the upper part; style 2.8–3.2 mm. long, geniculate in the middle part, glabrous; stigma with 2 lobes, the lower acute, the upper 1-tubercled, papillose; fruit unknown. (PL. V, FIGS. 17–24.)

DISTRIBUTION: Southeastern part of the Peruvian Andes to northwestern Bolivia, between 2800 and 3200 meters altitude.

PERU: PUNO: On road 4 km. north of Limbani, Province of Sandia, *D. Metcalf 30511* (UC, US). BOLIVIA: DEPT. ? : "In silvulis viciniis Acanea; carro de Uacani," *Mandon 834* (ISOTYPE GH).

This species is characterized by its short, simple, and terminal racemes and its ovate-elliptic and strongly revolute leaves.

22. *Monnina canescens* sp. nov.

Frutex, ramis 13–28 cm. longis ad 1.5–3.5 mm. crassis lignosis striatis canescentibus breviter puberulis; folia lanceolata 25–60 mm. longa 11–22 mm. lata, basim versus elongato-attenuata, apice acuta, supra tenuiter pubescentia vel glabrescentia, infra canescens pubescentia, integerrima, nervo medio prominulo, nervis lateralibus 4 vel 5, petiolo 1.5–2 mm. longo pubescente basi plus minusve articulo; racemi simplices conici 7–10 mm. crassi, rhachi 6.5–12.5 cm. longa puberula striata, pedunculati, pedunculo 30–35 mm. longo; bracteae ovato-acutae 1.5–2 mm. longae 0.8–1 mm.

latae ciliatae uninerviae subtus pubescentiae; flores 5.5–6.5 mm. longi, pedicello 1–1.2 mm. longo puberulo tereti; sepala exteriora concava ciliata lanceolata obtusa subtus pubescentia, duo inferiora 2–2.4 mm. longa 1.2–1.4 mm. lata $\frac{2}{3}$ connata uninervia, sepalo superiore 2.5–3 mm. longo 1.4–1.6 mm. lato 3-nervio; alae 5.5–6.8 mm. longae 4.2–5 mm. latae obovatae basi plus minusve obtusae ciliatae 4- vel 5-nerviae, nervo mediano conspicuo, subtus breviter puberulae vel glabrae, supra basi breviter puberulae; carina 5.2–7 mm. longa 3–4.2 mm. lata orbiculari-obovata glabra apice trilobata, lobo mediano obtuso emarginato, lobis lateralibus minoribus obtusiusculis, basi obtusa, 3- vel 4-nervia, breviter ciliata, petalo superiore tenuiter elongato spathulato utrinque dense pubescente; stamina 8, filamentis 4.5–5 mm. longis, antheris subsessilibus, filamentorum parte libera 0.6–1 mm. longa glabra; ovarium 1.5–2.4 mm. longum 1.2–1.5 mm. latum oblongum glabrum; stylus 3–3.5 mm. longus erectus deinde geniculatus et subhorizontalis glaber cylindricus; stigma apice superiore tuberculatum papillosum apice inferiore acutum; drupae ovato-oblongae acutae 4.8–6 mm. longae 3–3.6 mm. latae glabrae. (PL. V, FIGS. 25–32.)

DISTRIBUTION: In the central region of the Peruvian Andes, Department of Lima, between 2700 and 3000 meters altitude.

PERU: LIMA: Along Chillón River, above Obrajillo, June 13–23, 1925, Pennell 14376 (TYPE US 1340799, ISOTYPES Ch, GH).

The new species seems to be near *M. stipulata* Chodat, but it is distinct in the lanceolate and not revolute leaves, the shorter petiole, and the almost glabrescent branches. The proposed species comes from central Peru, while *M. stipulata* is from southern Peru and Bolivia. *Monnina canescens* is less closely related to *M. conferta* R. & P., from which it differs in having acute leaves, its branches not corymbose, a larger axis of the inflorescence, the keel glabrous within, etc.

23. *Monnina divaristachya* sp. nov.

Frutex ad 18 dm. altus ramosus, ramis 3–4 mm. crassis teretibus glabrescentibus; folia lanceolata 5.2–13.5 cm. longa 1.5–4.8 cm. lata basim versus elongato-attenuata apice acuminata, supra glabrescentia subtus breviter pubescentia, integerrima, nervo medio prominulo, nervis lateralibus 8 vel 9, petiolo 3–5 mm. longo breviter puberulo supra concavo; panícula ampla, ramis simplicibus fragilibus tenuiter pubescentibus striatis divaricatis 7–10 mm. crassis, rhachi 20–25 cm. longa brevi puberula striata, pedunculo 2.5–4.5 cm. longo, bracteis filiformibus 2–2.8 mm. longis ciliatis deciduis uninerviis; flores 3.2–3.5 mm. longi, pedicello 1.2–1.5 mm. longo puberulo; sepala exteriora plus minusve lanceolata ciliata concava subtus puberula vel glabra obtusa, duo inferiora 1.4–1.8 mm. longa 0.6–0.8 mm. lata $\frac{2}{3}$ connata 3-nervia, sepalo superiore 2–2.2 mm. longo 1.4–1.8 mm. lato 5-nervio; alae 3.8–4.2 mm. longae 4–4.2 mm. latae plus minusve obovatae basi acutae 3-nerviae subtus pubescentes; carina obovata 4.2–5.2 mm. longa 2.2–3.2 mm. lata intus puberula apice trilobata, lobo mediano obtuso emarginato, lobis lateralibus obtusiusculis majoribus, basi acuta 3-nervia, petalo superiore elongato spathulato utrinque puberulo; stamina 8, filamentis 3.2–4 mm. longis plus minusve connatis, parte libera 0.5–0.8 mm. longa glabra, antheris mucronatis; ovarium 1–1.6 mm. longum 0.6–0.8 mm. latum ovatum basi breviter puberulum vel glaberrimum

mum; stylus 3–3.2 mm. longus erectus deinde geniculatus et horizontalis glaber cylindricus; stigma apice superiore tuberculatum papillosum apice inferiore acutum; drupae ellipticae 5.5–7.5 mm. longae 4.2–5.5 mm. latae glabrae conspicue reticulatae. (Pl. VI, FIGS. 1–8.)

DISTRIBUTION: Confined to the “ceja de montaña” of Central Perú, Department of Junín, between 1600 and 1900 meters altitude.

PERU: JUNÍN: Pichis Trail, Eneñas, June 30–July 2, 1929, *Killip & Smith 25778* (TYPE US 1359873, ISOTYPES Ch, NY); Pichis Trail, *Killip & Smith 25427* (US).

This species suggests *M. callimorpha* Chodat but differs in several respects, namely the glabrescent branches, larger and glabrescent leaves with 8 or 9 pairs of lateral veins, and the broader panicle with larger and lax racemes.

24. *Monnina callimorpha* Chodat in Bot. Jahrb. 42: 101 (1908).

Monnina Killipii Chodat in Bull. Soc. Bot. Genève II. 25: 204 (1934).

Shrub, 24–30 dm. high, branched, the branches to 15 dm. long and 4 mm. in diameter, striate, conspicuously pubescent, the hairs yellow, lax; leaves lanceolate, 35–98 mm. long, 16–40 mm. wide, usually acuminate, rarely obtuse or acute, finely pubescent above, canescent-pubescent beneath, entire, attenuate at base, the costa prominulous beneath with 5 or 6 pairs of lateral veins; petioles 4–7 mm. long, concave above, convex beneath, pubescent, articulate; stipules 2–4 mm. long, 1–1.5 mm. wide, more or less cylindric, densely pubescent; inflorescence paniculate, the axis 8–13 cm. long, 1.5–2 mm. diameter, almost striate, canescent-pubescent, the racemes subsessile, more or less acute, 2–4 cm. long, 6–8 mm. wide, bracteate, the bracts triangular, 1–1.5 mm. long, 0.7–1 mm. wide, acute, pubescent beneath, deciduous, inconspicuous; flowers 4–5 mm. long, the pedicels 1–2 mm. long, finely pubescent; outer sepals ovate-lanceolate, ciliate, obtuse, slightly pubescent beneath, 1-nerved, the two lower ones 1.8–2 mm. long, 1–1.2 mm. wide, $\frac{1}{2}$ united, the upper one 2–2.2 mm. long, 1.6–1.8 mm. wide; wings blue, 4.4–4.8 mm. long, 3.6–4 mm. wide, obovate, obtuse at base, 3- or 4-nerved, finely pubescent at base, ciliate; keel yellow, 4.6–5 mm. long, 3–3.2 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger, slightly pubescent on a convex longitudinal line; upper petals almost elongate-spatulate, pubescent; stamens 8, the filaments 3.4–3.6 mm. long, almost entirely united, the free part 0.7–1.2 mm. long; ovary elliptic, 1.6–2.4 mm. long, 1–1.6 mm. wide, finely pubescent, the hairs short, strigose, becoming glabrescent; style 2.8–3 mm. long, geniculate above base, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, papillose; drupe ovate, 4.2–4.5 mm. long, 3.2–3.5 mm. wide, glabrescent, reticulate. (Pl. VI, FIGS. 9–16.)

DISTRIBUTION: In the Andes of central Perú, Department of Junín, between 1800 and 3200 meters altitude.

PERU: JUNÍN: Huacapistana, *Killip & Smith 24253* (US); Carpapata, above Huacapistana, *Killip & Smith 24421* (type of *Monnina Killipii* Ch, isotype NY); Huacapistana, *Weberbauer 2070* (photograph of the TYPE, Ch).

This shrub occurs in the region called “ceja de montaña.” It is close to *M. Pavoni* Chodat but is not scandent, has obtuse outer sepals, pubescent wings, a glabrous style, and the anthers not mucronate.

It seems desirable to accept *M. Killipii* as synonymous, since its type shows the same characters as that of *M. callimorpha* and was found in the same region.

25. *Monnina ovata* sp. nov.

Frutex scandens ramosus, ramis 2–5 mm. crassis lignosis conspicue striatis glabris; folia ovata 3.2–8.6 cm. longa 1.6–3.5 cm. lata apice obtusa utrinque glabra integerrima, nervo medio prominulo, nervis lateralibus 9 vel 10, petiolo 4–6 mm. longo breviter puberulo vel glabro supra concavo; panícula ampla ramosissima, racemis laxis plus minusve elongatis striatis breviter puberulis vel glabris 8–10 mm. crassis conicis, rhachi 12–16 cm. longa glabra striata, tenuiter pedunculatis, pedunculo 4–4.5 cm. longo, bracteis inconspicuis deciduis; flores globosi 4.5–5.5 mm. longi, pedicello 1–1.2 mm. longo breviter puberulo; sepala exteriora lanceolata ciliata concava obtusa, duo inferiora 2.2–2.4 mm. longa 1.6–1.7 mm. lata $\frac{1}{2}$ connata 3-nervia subtus glabrescentia, sepalo superiore 2.8–3 mm. longo 2.6–2.8 mm. lato 5-nervio subtus puberulo; alae 5–5.8 mm. longae 4.5–5 mm. latae obovatae basi plus minusve obtusae 3- vel 4-nerviae conspicue ciliatae subtus breviter pubescentes; carina obovata 5–6 mm. longa 3.2–3.8 mm. lata intus puberula apice trilobata, lobo mediano obtuso emarginato, lobis lateralibus obtusiusculis conspicue ciliatis basi acutis, 3- vel 4-nervia, petalo superiore dilatato vel spatulato utrinque puberulo; stamina 8, filamentis 4–4.4 mm. longis, filamentorum parte libera 0.6–1 mm. longa glabra; ovarium 1.5–2 mm. longum 0.9–1 mm. latum ovatum puberulum; stylus 2.2–2.6 mm. longus geniculatus circa basim glaber; stigma apice superiore tuberculatum papillosum apice inferiore plus minusve obtusum; drupae ellipticae 5.5–7 mm. longae 3.5–4 mm. latae glabrae reticulatae. (PL. VI, FIGS. 17–24.)

DISTRIBUTION: Known only in Central Perú, Department of Huánuco, at about 2700 meters altitude.

PERU: HUÁNUCO: Playapampa, June 16–24, 1923, *Macbride 4493* (TYPE US 1191510, ISOTYPE Ch).

Monnina ovata seems closely related to *M. Ruiziana* Chodat, from which it differs in its glabrous and scandent habit, striate branches, obtuse leaves, and pubescent ovary. From *M. callimorpha* Chodat, another ally, the new species differs in its glabrous habit, obtuse leaves, 3-nerved lower sepals, etc.

26. *Monnina polystachya* R. & P. Syst. Veg. 171 (1798).

Scandent, to 45 dm. high, branched, the branches 4–5 mm. in diameter, striate, densely pubescent, the hairs yellow, 1.2–2 mm. long; leaves lanceolate, 25–76 mm. long, 10–35 mm. wide, usually acute, rarely obtuse, pubescent above, canescent-pubescent beneath, entire, attenuate at base, the costa prominulous beneath, with 5 or 6 pairs of lateral veins; petioles 2–6 mm. long, concave above, convex beneath, densely pubescent, articulate at base; inflorescence paniculate, the axis 7–12 cm. long, 1.5–2.5 mm. in diameter, striate, pubescent, the racemes 4–7, subsessile, more or less acute, 3–10.5 cm. long, 8–10 mm. wide, bracteate, the bracts lanceolate, 2–3.2 mm. long, 0.8–1.2 mm. wide, acuminate, pubescent beneath, ciliate, deciduous, 1-nerved; flowers 4.6–5 mm. long, the pedicels 1–1.2 mm. long, pubescent; outer sepals almost lanceolate, acute, ciliate, the two

lower ones 1.4–1.6 mm. long, 1.8–2 mm. wide, $\frac{2}{3}$ united, 1-nerved,*glabrous beneath, the upper one 2.2–2.4 mm. long, 1.6–1.8 mm. wide, 5-nerved, pubescent beneath; wings 5–5.4 mm. long, 4.5–5 mm. wide, obovate, obtuse at base, 4- or 5-nerved, glabrous beneath, ciliate at base; keel 4.8–6 mm. long, 3–3.4 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals slightly spatulate, pubescent within; stamens 8, the filaments 3–3.8 mm. long, more or less united, the free part 1–1.5 mm. long; ovary ovoid, 1.2–1.6 mm. long, 1–1.2 mm. wide, pubescent near its base, sometimes becoming glabrescent; style 3–3.5 mm. long, geniculate above base, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe elliptic, 5–7.5 mm. long, 3–5 mm. wide, glabrescent, reticulate. (PL. VII, FIGS. 1–8.)

DISTRIBUTION: Central Perú, Department of Huánuco, at about 3000 meters altitude.

PERU: HUÁNUCO: 6 miles south of Mito, *Macbride & Featherstone* 1848 (Ch, US); "in Huanuci Provincia," *Ruiz & Pavón* without number (photograph of TYPE, US).

This species, which in habit is scandent and densely puberulous, with lax racemes, is the type of the genus *Monnina*.

27. *Monnina Pavoni* Chodat in Bull. Herb. Boiss. 3: 132 (1895), in Bot. Jahrb. 42: 102 (1908).

Monnina huacachiana Chodat in Bull. Soc. Bot. Genève II. 25: 210 (1934).

Scandent, branched, the branches 3–7 mm. in diameter, conspicuously pubescent, becoming more or less glabrescent, striate; leaves lanceolate, 32–90 mm. long, 12–30 mm. wide, usually acute, sometimes acuminate, pubescent above, conspicuously canescent-pubescent beneath, entire, attenuate at base, the costa prominulous beneath, with 5 or 6 pairs of lateral veins; petioles 2.5–7 mm. long, almost cylindric, pubescent; leaflets occurring in the axils; inflorescence paniculate, the axis 10–24 cm. long, 1.5–2 mm. in diameter, striate, pubescent, the racemes numerous, more or less acute, 7–19 cm. long, 7–10 mm. wide, pedunculate (peduncle 12–24 mm. long), bracteate, the bracts lanceolate, 3–3.6 mm. long, 1–1.2 mm. wide, acuminate, pubescent beneath, ciliate, deciduous, 1-nerved; flowers 4–4.8 mm. long, the pedicels 1.2–1.8 mm. long, pubescent; outer sepals lanceolate, more or less acuminate, ciliate, slightly pubescent beneath, the two lower ones 1.8–2.4 mm. long, 0.8–1 mm. wide, $\frac{1}{2}$ united, 1-nerved, the upper one 2–2.5 mm. long, 1.4–1.6 mm. wide, 3-nerved; wings deep blue, 4–5 mm. long, 3.2–4.8 mm. wide, obovate, more or less obtuse at base, with 3 or 4 nerves, glabrous; keel yellow, 4.6–5.6 mm. long, 2.6–3.2 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals elongate-spatulate, pubescent; stamens 8, the filaments 3.5–4 mm. long, almost entirely united, the free part 1.2–1.5 mm. long, the anthers mucronate; ovary elliptic, 1.2–1.6 mm. long, 0.9–1.3 mm. wide, pubescent, the hairs short, strigose, sometimes more or less glabrescent; style 2.5–3.2 mm. long, geniculate above base, pubescent near base, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe elliptic, 4.2–5.4 mm. long, 2.2–3.2 mm. wide, usually glabrescent, rarely inconspicuously pubescent, reticulate. (PL. VII, FIGS. 9–16.)

DISTRIBUTION: Central Andes of Perú, Department of Huánuco, between 2000 and 2700 meters altitude.

PERU: HUÁNUCO: Huacachi, Estación near Muña, *Macbride* 3885 (Ch, US), 4124 (type of *M. huacachiana*, Ch); Pano, *Macbride* 3622 (A, Ch, NY).

This species is near *M. polystachya* R. & P. but has the following differences: glabrescent branches, larger panicle up to 24 cm. long, outer sepals almost acuminate, style pubescent near its base, and anthers mucronate.

In Bull. Herb. Boiss. 4: 247 (1896) Chodat states that *M. Pavoni* is synonymous with *M. polystachya*, but later the same author, in Bot. Jahrb. 42: 102 (1908), says: "Non est eadem ac *M. polystachya* Ruiz et Pavon, ut erronee indic. Bull. Herb. Boiss. IV., 247."

The type of *M. huacachiana* agrees well with Chodat's description of *M. Pavoni* and furthermore comes from the same region as the type of the earlier binomial.

28. *Monnina pseudo-polystachya* Chodat in Bull. Soc. Bot. Genève II. 25: 217 (1934).

Scandent, branched, the branches decurrent, 22–34 cm. long, terete, pubescent; leaves more or less lanceolate, 25–100 mm. long, 9–42 mm. wide, acute, pubescent above, conspicuously pubescent beneath, entire, attenuate at base, the costa prominulous beneath, with 4 or 5 pairs of lateral veins; petioles 3–6 mm. long, concave above, convex beneath, densely pubescent; leaflets occurring in the axils; inflorescence paniculate, the axis 8–12 cm. long, 1.2–2 mm. in diameter, more or less striate, densely pubescent, the racemes numerous, 2.5–6 cm. long, 8–10 mm. wide, acute, subsessile, bracteate, the bracts inconspicuous, deciduous; flowers 4.5–5.2 mm. long, the pedicels 0.8–1 mm. long, pubescent; outer sepals triangular, acute, ciliate, strongly pubescent beneath, 1-nerved, the two lower ones 1.4–1.6 mm. long, 0.9–1 mm. wide, $\frac{1}{2}$ united, the upper one 2–2.2 mm. long, 1.4–1.5 mm. wide; wings 4.4–5 mm. long, 4.5–5 mm. wide, obovate, obtuse at base, 4- or 5-nerved, pubescent beneath near base, ciliate at base; keel 4.5–5 mm. long, 3–3.5 mm. wide, orbicular, plicate, glabrescent within, sometimes with a few hairs, obtuse at base, 3- or 4-nerved, submarginate at apex, slightly pubescent on a convex longitudinal line, the hairs 0.5–0.6 mm. long, almost rigid; upper petals spatulate, pubescent; stamens 8, the filaments 3.5–4 mm. long, almost entirely united, the free part 1–1.8 mm. long; ovary elliptic, 1.4–2.2 mm. long, 1–1.3 mm. wide, strongly pubescent, the hairs rigid, ascendent; style 2.5–3.2 mm. long, geniculate above base, conspicuously pubescent in the upper part, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; fruit unknown. (PL. VII, FIGS. 17–24.)

DISTRIBUTION: The sierra of central Perú, Department of Huánuco, at about 2400 meters altitude.

PERU: HUÁNUCO: Muña, trail to Tambo de Vaca, *Macbride* 4317 (TYPE Ch, ISOTYPE US).

This plant is close to *M. polystachya* R. & P., from which it differs in having larger and thicker leaves, the outer sepals strongly pubescent beneath, the wings more or less pubescent beneath, the keel slightly pubescent on a convex line, the ovary strongly pubescent, and the style with con-

spicuous hairs. It differs from *M. Pavoni* Chodat in having the axis of the panicle to 12 cm. long, the branches densely pubescent, the outer sepals with rigid and conspicuous hairs beneath, the ovary strongly pubescent, etc.

29. *Monnina Ruiziana* Chodat in Bot. Jahrb. 42: 100 (1908).

Shrub, to 30 dm. high, branched, the branches terete, densely hirsute; leaves elliptic, 45–50 mm. long, 35–40 mm. wide, more or less acute, conspicuously hirsute, entire, the costa prominulous beneath; petioles 4–6 mm. long, pubescent; inflorescence paniculate, the racemes divaricate, densely hirsute, lax, bracteate, the bracts almost filiform, deciduous, inconspicuous; flowers 3.5–4 mm. long, with a short pedicel; outer sepals ovate-triangular, obtuse or more or less acute, ciliate, pubescent beneath, the two lower ones united; wings orbicular, attenuate at base; keel hemispheric, yellow, 3-lobed, the lobes obtuse; upper petals linear, or dilated; androecium pubescent in the upper part, the filaments almost entirely united; ovary glabrous, rarely more or less pubescent; style geniculate; stigma with 2 lobes; fruit unknown.

DISTRIBUTION: In the region of Central Perú, Department of Huánuco, between 2000 and 2900 meters altitude.

PERU: HUÁNUCO: Monzón, Province of Huamalíes, *Weberbauer 3355* (photograph of TYPE, US).

The writer has seen no material of this species except the photograph of the type; it would seem to be near *M. polystachya* R. & P. but distinct from it in being a shrub, being more pubescent, having a glabrous ovary, etc. It is also related to *M. Pavoni* Chodat but differs in having terete and densely pubescent branches, lanceolate leaves, a glabrous ovary, and in its shrubby habit.

29a. *Monnina Ruiziana* forma *longepetiolata* Chodat, op. cit. 101.

According to Chodat, the form differs from the typical specimen in having longer petioles, to 7.8 mm. long.

PERU: HUÁNUCO: Monzón, Province of Huamalíes, 2000–2500 meters, *Weberbauer 3527* (TYPE, not seen).

The writer has seen no material of this form.

30. *Monnina connectisepala* Chodat in Bull. Soc. Bot. Genève II. 25: 213 (1934).

Monnina tenuifolia Chodat, op. cit. 212; not Chodat (1895).

Monnina stipulata var. *tenuibracteata* Chodat, op. cit. 205.

Shrub, 15–25 dm. high, branched, more or less pubescent, becoming glabrescent, the branches 3–6 mm. in diameter, conspicuously striate; leaves usually elliptic, rarely more or less lanceolate, 30–100 mm. long, 15–40 mm. wide, acute, sometimes obtuse, glabrescent, entire, attenuate at base, the costa prominulous beneath, with 9 or 10 pairs of lateral veins; petioles 4–8 mm. long, articulate, pubescent; stipules conical-cylindric, 2–3 mm. long, glabrescent; inflorescence paniculate, the axis 7–18 cm. long, 1.5–2.5 mm. in diameter, striate, usually glabrescent, sometimes finely pubescent, the racemes lax, divaricate, acute, 3–14 cm. long, 7–10 mm. wide, bracteate, the bracts ovate, acute, sometimes lanceolate, 2.2–3 mm. long, 1–2 mm. wide, pubescent beneath, 1-nerved, ciliate, deciduous; flowers 5–5.8 mm. long, the pedicels 1–1.6 mm. long, finely pubescent; outer sepals ovate-lanceolate, ciliate, usually obtuse, rarely more or less

acute, the two lower ones 1.8–2.2 mm. long, 1–1.5 mm. wide, united almost $\frac{2}{3}$, glabrescent beneath, 1–3-nerved, the upper one 2.5–3.2 mm. long, 1.8–2.5 mm. wide, finely pubescent beneath, 5–7-nerved; wings dark blue, 5–6 mm. long, 4.6–5.2 mm. wide, obovate, obtuse at base, 3-nerved (middle nerve conspicuous), slightly pubescent beneath, sometimes with a few hairs within, ciliate at base; keel yellow, 5–6 mm. long, 3.2–4.2 mm. wide, orbicular, plicate, pubescent within, rarely glabrescent, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger, rarely with a few hairs on a convex longitudinal line; upper petals spatulate, pubescent; stamens 8, the filaments 3.5–4.2 mm. long, unequally united, the free part 0.4–1.6 mm. long; ovary ovoid, 1.4–2.2 mm. long, 1–1.4 mm. wide, glabrous; style 2.6–3.4 mm. long, geniculate above base, glabrous, more or less cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe elliptic, 4–8 mm. long, 2–5 mm. wide, glabrous, reticulate, rarely more or less marginate. (Pl. VII, FIGS. 25–32.)

DISTRIBUTION: Found only in the Andes of southern Perú, Department of Cuzco, between 2200 and 3200 meters altitude.

PERU: Cuzco: Pillahuata, cerro de Cusilluyoc, *Pennell 13977* (type of *Monnina tenuifolia* [1934] Ch, isotypes GH, Ph), *Pennell 14095* (TYPE Ch, ISOTYPE Ph), *14022* (Ch, GH, Ph), *14122* (type of *Monnina stipulata* var. *tenuibracteata* Ch, isotypes GH, M, Ph, US); Laderas de Pillahuata, Province of Paucartambo, *Vargas 81* (Ch); near Pillahuata, Province of Paucartambo, *West 7071* (GH, UC); Distrito Marcacocha, Province of Paucartambo, *Vargas 11130* (Ch, UC); summit of Huayna Picchu, *West 6430* (M, UC); Canyon of Cachu-pampa, Araza River, Distrito Marcapata, Province of Quispicanchis, *Vargas 9672* (Ch, UC).

Fortunately it has been possible to see the types of the names above cited, collected in the same locality, and the whole of the material agrees well with the type of the species. Chodat, in 1895, described *M. tenuifolia* from specimens found in Colombia, which is very different from this entity.

The present species is close to *M. Ruiziana* Chodat but differs in the glabrescent branches, the larger leaves (to 10 cm. long), and in its more southern distribution.

31. *Monnina Lechleriana* Chodat in Bull. Herb. Boiss. 3: 129 (1895).

Frutescent, branched, the branches 3–4 mm. in diameter, striate, hirsute in the upper part; leaves lanceolate-elliptic, 60–85 mm. long, 20–32 mm. wide, acute, glabrescent, entire, somewhat revolute, petiolate, the costa prominentulous beneath; stipules to 2 mm. long and 0.3 mm. wide, cylindric; inflorescence paniculate, narrow, the axis striate, bracteate, the bracts deciduous, inconspicuous; flowers 4–4.5 mm. long, the pedicels 1.4–1.5 mm. long, slightly pubescent; outer sepals ovate-lanceolate, ciliate, the two lower ones 1.5–1.6 mm. long, 0.8–1 mm. wide, $\frac{1}{2}$ united, 1-nerved, glabrous beneath, obtuse, the upper one 2.2–2.4 mm. long, 1.2–1.3 mm. wide, 5–7-nerved, finely pubescent beneath, acute; wings 4–4.2 mm. long, 4–4.3 mm. wide, obovate, obtuse at base, 5-nerved, glabrous; keel 4–4.4 mm. long, 2.5–2.8 mm. wide, orbicular, plicate, more or less pubescent within, obtuse at base, 4- or 5-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals elongate-spatulate, finely pubescent; stamens 8, the filaments 2.6–3 mm. long, united almost $\frac{1}{3}$, the free part 1–1.2 mm. long, glabrous; ovary ovoid, 1–1.2 mm. long, 0.5–0.6 mm. wide,

glabrous; style 2.8–3 mm. long, geniculate, glabrous, cylindric; stigma with 2 lobes, the lower more or less acute, the upper 1-tubercled, the tubercle papillose; fruit unknown. (PL. VIII, FIGS. 1–7.)

DISTRIBUTION: Andes of southern Perú.

PERU: DEPT. ? : "Tabina," *Lechler 2072* (fragments of TYPE Ch, US; photograph of type US).

It seems probable that this species was found in the southeastern part of Perú, since Lechler collected chiefly in the Department of Puno. The description given above is adapted from the original description and the cited photograph.

32. *Monnina Clarkeana* Chodat in Bull. Herb. Boiss. 4: 246 (1896).

Frutescent, branched, the branches numerous, slightly hirsute on the upper part; leaves numerous, lanceolate, sometimes more or less ovate-lanceolate, 18–54 mm. long, 6–22 mm. wide, acute, finely pubescent, becoming glabrescent, entire, attenuate at base, the costa prominulous beneath, with inconspicuous lateral veins; petioles to 7 mm. long, cylindric, pubescent; inflorescences paniculate, numerous, axillary, conspicuously pedunculate, with a leaflet at base, the leaflet to 35 mm. long, the racemes numerous, lax, 4–6 cm. long, bracteate, the bracts almost filiform, conspicuous in the upper part; flowers 3.8–5 mm. long, the pedicels 1.8–2 mm. long, finely pubescent; outer sepals lanceolate, ciliate, acute, glabrous beneath, the two lower ones 1.2–1.4 mm. long, 0.8–1 mm. wide, $\frac{1}{3}$ united, 1-nerved, the upper one 1.6–1.8 mm. long, 1–1.2 mm. wide, 3-nerved; wings 3.2–4 mm. long, 3.4–3.6 mm. wide, obovate, obtuse at base, with 5 nerves, glabrous; keel 3.6–4.2 mm. long, 2.6–2.8 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 4- or 5-nerved, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals strongly elongate-spatulate, pubescent; stamens 8, the filaments 3–3.5 mm. long, united almost $\frac{2}{3}$, the free part 1–1.2 mm. long; ovary ellipsoid, 1.2–1.4 mm. long, 0.6–0.8 mm. wide, glabrous; style 2.5–3 mm. long, geniculate, glabrous, cylindric; stigma with 2 lobes, the lower obtuse, the upper 1-tubercled, the tubercle papillose; fruit unknown. (PL. VIII, FIGS. 8–14.)

DISTRIBUTION: Known only from the northern part of the Peruvian Andes.

PERU: DEPT. ? : "in Peruvia," *Mathews 1192* (fragments and photograph of the TYPE US).

Presumably found in northern Perú, Department of Amazonas, where Mathews spent many years collecting in the Chachapoyas area. The species is near *M. Lechleriana* Chodat, from which it differs in having elongate, numerous, and separate racemes, the lower sepals acute, the upper petals conspicuously elongate-spatulate, etc.

33. *Monnina ligustrifolia* H.B.K. Nov. Gen. et Sp. 5: 417 (1821).

Frutescent, branched, more or less terete, finely pubescent, becoming glabrescent; leaves lanceolate, 36–65 mm. long, 10–20 mm. wide, acute, finely pubescent, entire, attenuate at base, the costa prominulous beneath, the veins more or less reticulate; petioles 1.5–3 mm. long, semiterete, pubescent; racemes conical, acute, simple, terminal or axillary, the axis 3–6.5 cm. long, striate, slightly pubescent, bracteate, the bracts conspicuous, ovate, acute, deciduous, ciliate; flowers 4–4.2 mm. long; pedicels 1.6–1.8 mm. long, pubescent; outer sepals free, ovate-triangular, ciliate, the two

lower ones 1.5–1.6 mm. long, 1.6–1.7 mm. wide, glabrous beneath, obtuse, 5-nerved, the upper one 2–2.2 mm. long, 1.6–1.8 mm. wide, pubescent beneath, acute, 7-nerved; wings 4–4.2 mm. long, 3.5–3.6 mm. wide, obovate, obtuse at base, 3- or 4-nerved, glabrous beneath, ciliate at base; keel 3.8–4 mm. long, 2.3–2.5 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 3-nerved, ciliate, 3-lobed, the middle lobe obtuse-emarginate; upper petals short, finely pubescent; stamens 8, the filaments 2.8–3 mm. long, almost entirely united, the free part 0.6–1 mm. long, glabrous; ovary ellipsoid, 1–1.2 mm. long, 0.6–0.7 mm. wide, glabrous; style 2.2–2.4 mm. long, straight, becoming geniculate in the middle part, cylindric; stigma thicker than the style, with 2 lobes, the lower obtuse, the upper 1-tubercled, the tubercle papillose; drupe ovoid, 4.5–4.8 mm. long, 2.8–3 mm. wide, glabrous, reticulate. (PL. VIII, FIGS. 15–22.)

DISTRIBUTION: Andes of northern Perú, Department of Piura.

PERU: PIURA: Ayavaca, *Bonpland* 3491 (fragments and photograph of TYPE US).

Characterized by the simple terminal or axillary racemes with conspicuous ovate acute bracts. The measurements of the leaves are taken from the photograph.

34. *Monnina salicifolia* R. & P. Syst. Veg. 172 (1798).

Monnina crotalarioides DC. Prodr. 1: 339 (1824).

Monnina crotalarioides var. *glabrescens* Chodat in Bot. Jahrb. 42: 99 (1908).

Monnina crotalarioides var. *pseudo-loxensis* Chodat, l. c.

Monnina crotalarioides var. *macrophylla* Chodat, l. c.

Monnina crotalarioides var. *leptostachys* Chodat, l. c.

Shrub 5–25 dm. high, branched, the branches 7–34 cm. long, 1–5 mm. in diameter, nodose, pubescent, becoming glabrescent, striate; leaves usually elliptic, rarely more or less lanceolate, 12–70 mm. long, 7–25 mm. wide, obtuse, sometimes acute, finely pubescent, becoming more or less glabrescent, entire, slightly revolute, attenuate at base, the costa prominulous beneath, with 4 or 5 pairs of lateral veins; petioles 1–2.5 mm. long, concave above, convex beneath, articulate, pubescent; racemes conical, acute, 9–12 mm. wide, simple, terminal, pedunculate, the peduncle 5–12 mm. long, the axis 1–8 cm. long, pubescent, striate, bracteate, the bracts acute-triangular, 1.4–3 mm. long, 1.4–1.8 mm. wide, deciduous, ciliate, 1-nerved, finely pubescent beneath; flowers 4.5–6.5 mm. long, the pedicels 1–1.4 mm. long, finely pubescent; outer sepals free, ovate-triangular, obtuse, ciliate, more or less pubescent beneath, the two lower ones 1.4–2.2 mm. long, 1.6–2 mm. wide, 3-nerved, the upper one 2.2–3 mm. long, 1.8–2.4 mm. wide, 5-nerved; wings indigo-blue, 5.6–6.8 mm. long, 4.8–6 mm. wide, obovate, obtuse at base, 3- or 4-nerved, usually slightly pubescent beneath, glabrescent within, sometimes with a few hairs at base; keel yellow, 5–7 mm. long, 3–4 mm. wide, orbicular, plicate, pubescent within, sometimes glabrescent, obtuse at base, 3- or 4-nerved, 3-lobed, the middle lobe obtuse-emarginate; upper petals more or less elongate, spatulate, pubescent; stamens 8, the filaments 3.8–4.2 mm. long, almost entirely united, the free part 0.8–1.4 mm. long, glabrous; ovary ovoid, 1.6–2.8 mm. long, 1–1.6 mm. wide, glabrous; style 2.8–3.5 mm. long, geniculate, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe ellipsoid, 4.8–6 mm. long, 2.5–3.5 mm. wide, glabrous, reticulate. (PL. VIII, FIGS. 23–31.)

DISTRIBUTION: Along the Andes from southern Ecuador to the northwestern part of Bolivia, between 1800 and 3900 meters altitude.

ECUADOR: AZUAY: Road from Cuenca towards Cumbe, *Haught* 3347 (US). PERU: LA LIBERTAD: Eastern base of Cerro Huaylillas, Province of Huamachuco, *West* 8125 (GH, M, UC); HUÁNUCO: 6 km. south of Huánuco, *Stork & Horton* 9375 (Ch, DA, UC); LIMA: Río Blanco, *Killip & Smith* 21621 (Ch, NY, US), 21609 (US), *Macbride & Featherstone* 664 (Ch, US); Matucana, *Macbride & Featherstone* 95 (Ch, US); vicinity of Huarochiri, *Hrdlicka* without number (US); vicinity of San Damián, *Hrdlicka* without number (US); JUNÍN: vicinity of Oroya, *Rose & Rose* 18698 (US); Huancayo, *Museo de Historia Natural de Lima* 83 (US); quebradas east of Huancayo, *Stork & Horton* 10220 (Ch, DA, UC); between Viques and Ingahuasi, south of Huancayo, Mantaro Canyon, *Killip & Smith* 22175 (Ch, NY, US); AYACUCHO: "Tambillo," *West* 3651 (UC); HUANCAVELICA: Near Córdova, Province of Castrovirreina, *Metcalfe* 30276 (US, UC); APURÍMAC: Pincos, Province of Andahuaylas, *Stork & Horton* 10680 (Ch, UC); Chincheros, near town, *West* 3693 (UC); Cuzco: Paucartambo Valley, *Herrera* 2965 (NY, US); Hacienda Churu, Province of Paucartambo, *Herrera* 1029a (US); Huailabamba, Paucartambo, *Balls* 6739 (US); near Quencomayo, below Colquipata, Paucartambo, *Pennell* 13784 (Ph); Cerro Macchu Picchu, Province of Urubamba, *Mexia* 8074a (US); summit of Huayna Picchu, *West* 6430 (GH); Ollantaytambo, *Cook & Gilbert* 1219 (US), 273 (US); San Miguel, Urubamba Valley, *Cook & Gilbert* 1154 (US); Urubamba, *Soukup* 33 (Ch); Sacsahuaman, above Cuzco, *Pennell* 13549 (Ch, GH, NY, Ph, US); Colinas del Sacsahuaman, *Herrera* 2376 (Ch); Colinas del Sacsahuaman, *Herrera* without number (Ch); Colinas del Rodadero, *Vargas* 3147 (Ch); Vilcanota, below Caicai, *Pennell* 14188 (Ch, GH, NY, Ph, US); Marcapata, Province of Quispicanchis, *Vargas* 1334 (Ch); Province of Quispicanchis and Cuzco, *Herrera* 682 (US); San Sebastián, *Pennell* 13617 (Ch, GH, NY, Ph); Convención, *Vargas* 1838 (GH); Cuzco, *Herrera* without number (NY, US), 3096 (US); DEPT. ? : Mantaro, *Herrera* 763a (US); without locality and date, *Dombey* 627 (Ch), *Mathews* 3024 (GH); without locality, 1862, *Mathews* without number (NY); without locality, 1839-40, *Gay* without number (Ch); without locality and date, *Neé* without number (photograph of TYPE US), *Paris Herbarium* without number (fragments of authentic material of *M. salicifolia*, US), *Collector* ? without number (fragments of authentic material of *M. crotalarioides*, US). BOLIVIA: LA PAZ: Sorata, *Rusby* 1910 (US), *R. S. Williams* 2381 (US); vicinity of Sorata, *Bang* 1305 (US); DEPT. ? : Titicaca, March, 1924, *Buchtien* without number (US); without locality, *Bang* 2804 (US).

This plant is very common in the sierra. Ruiz & Pavón cited as localities, "Huarocheri, Tarmae et Panatahuarum Provincias." These places are situated in the Departments of Lima and Junín, and most of the available specimens of this species came from that region. Fragments of authentic material of this entity, and also of *M. crotalarioides*, and a photograph of the type were available to the writer. The brief descriptions given by Chodat for his varieties of *M. crotalarioides* agree with *M. salicifolia*. In addition, the localities are in the region of the sierra and some are from essentially the type-locality.

34a. *Monnina salicifolia* var. *pilostylis* var. nov.

A varietate typica differt stylo conspicue piloso.

PERU: LIMA: Río Blanco, April 15-17, 1929, *Killip & Smith* 21569 (TYPE Ch, 632059, ISOTYPES NY, US); HUANCAVELICA: 4 km. north of Yauli, Prov. Huancavelica, *Stork & Horton* 10882 (Ch, UC).

35. *Monnina hirtella* sp. nov.

Frutex ad 15 dm. altus conspicue canescenti-pubescent, ramis 2.5-5 mm.

crassis striatis; folia lanceolata 3.5–11 cm. longa 1–3.4 cm. lata basim versus elongato-attenuata apice acuminata, utrinque conspicue pubescentia, integerrima, nervo medio prominulo, nervis lateralibus 6 vel 7, petiolo 2–5 mm. longo puberulo; racemi simplices terminales vel axillares plus minusve conici 7–9 mm. crassi, rhachi 3.5–13 cm. longa puberula striata, pedunculo 8–28 mm. longo, bracteis lanceolatis acutis 1–1.8 mm. longis 0.6–1 mm. latis subtus puberulis uninerviis ciliatis deciduis; flores 4–5 mm. longi, pedicello 1.2–1.4 mm. longo puberulo; sepala exteriora libera plus minusve lanceolata ciliata concava obtusa subtus puberula, duo inferiora 1.8–2.2 mm. longa 1.5–1.6 mm. lata 3-nervia, sepalo superiore 2.4–2.6 mm. longo 1.4–1.6 mm. lato 5-nervio; alae 4.8–5 mm. longae 3.6–4 mm. latae obovatae basi obtusae 3-nerviae subtus basi pubescentes; carina 4.6–5.2 mm. longa 2.6–3 mm. lata orbicularis obovata intus puberula apice trilobata, lobo mediano obtuso emarginato, lobis lateralibus obtusiusculis, basi obtusa 3-nervia, petalo superiore elongato spathulato utrinque conspicue pubescente, pilis 1.2–1.5 mm. longis; stamina 8, filamentis 3.8–4 mm. longis, antheris subsessilibus, filamentorum parte libera 0.8–1 mm. longa glabra; ovarium 1.2–2 mm. longum 0.8–1 mm. latum oblongum glabrum; stylus 3.4–3.5 mm. longus conspicue geniculatus glaber cylindricus; stigma apice superiore tuberculatum papillosum apice inferiore acutum; drupae ellipticae 5.5–7 mm. longae 3.5–4 mm. latae glabrae reticulatae. (PL. VIII, FIGS. 32–41.)

DISTRIBUTION: In the eastern range of the Andes of northern Perú, Department of San Martín, between 1100 and 1200 meters altitude.

PERU: SAN MARTÍN: Jepelacio, near Moyobamba, October–November, 1933, *Klug 3337* (TYPE US 1457745, ISOTYPES A, Ch, GH); San Roque, *L. Williams 7105* (Ch, NY).

The new species suggests *M. ligustrifolia* H. B. K., but the leaves are almost twice as large and acuminate, and the axis of the racemes is longer, conspicuously pubescent, and without acute-ovate bracts at its apex. It is less closely related to *M. salicifolia* R. & P., from which it differs in the larger and acuminate leaves, to 11 cm. long, the longer petiole, and the pubescent habit.

36. *Monnina cyanea* Chodat in Bot. Jahrb. 42: 100 (1908).

Frutescent, 5–10 dm. high, conspicuously branched, the branches 25.5–57 cm. long, 1.5–3 mm. in diameter, striate, canescent-pubescent, the hairs 0.5–0.7 mm. long, lax; leaves lanceolate, sometimes more or less oblanceolate, 22–60 mm. long, 10–20 mm. wide, usually acute, rarely acuminate, sometimes almost obtuse, finely canescent-pubescent, entire, attenuate at base, the costa prominulous beneath, with 5–7 pairs of lateral veins; petioles 1–2 mm. long, concave above, convex beneath, pubescent; stipules 0.3–0.5 mm. long, glabrous, coriaceous; racemes conical, more or less acute, 8–10 mm. wide, simple, terminal, pedunculate, the peduncle 8–14 mm. long, the axis 2.5–12 cm. long, pubescent, striate, bracteate, the bracts linear-lanceolate, 1.2–2.8 mm. long, deciduous, ciliate, 1-nerved, pubescent beneath; flowers 3.5–3.8 mm. long, the pedicels 1.2–1.3 mm. long, pubescent; outer sepals free, lanceolate, obtuse, ciliate, glabrescent beneath, sometimes more or less pubescent, the two lower ones 1.4–1.5 mm. long, 0.7–0.8 mm. wide, usually 1-nerved, rarely 5-nerved, the upper one 1.8–2 mm. long, 1–1.2 mm. wide, 3–5-nerved; wings deep blue, 3.6–4.2

mm. long, 3.5–3.8 mm. wide, obovate, obtuse at base, ciliate, 2- or 3-nerved, slightly pubescent beneath; keel yellow, 3.8–4.5 mm. long, 3.8–4.2 mm. wide, more or less orbicular, plicate, glabrous within, finely ciliate at base, 3-nerved, 3-lobed, the middle lobe obtuse-emarginate, smaller; upper petals narrow, attenuate, pubescent; stamens 8, the filaments 3–3.2 mm. long, almost entirely united, the free part 0.8–1 mm. long, glabrous; ovary ovoid, 1–1.3 mm. long, 0.6–1 mm. wide, densely pubescent, the hairs ascendent, rigid; style 2.4–2.5 mm. long, geniculate above base, glabrous, almost cylindric; stigma thicker, with 2 lobes, the lower obtuse, the upper 1-tubercled, the tubercle papillose; fruit drupaceous, cordiform-flattened, 4.4–5 mm. long, 4–5 mm. wide, conspicuously pubescent, acute, emarginate at base, slightly reticulate. (PL. VIII, FIGS. 42–51.)

DISTRIBUTION: Southeastern part of Perú, Departments of Cuzco and Puno, between 1800 and 3500 meters altitude.

PERU: Cuzco: Chaupichaca, Marcapata Valley, Province of Quispicanchi, *Weberbauer* 7835 (Ch); Puno: Between Sandia and Cuyocuyo, *Weberbauer* 878 (photograph of TYPE, Ch); near Limbani, Province of Sandia, *Metcalf* 30480 (UC, US).

Characterized by its canescent-hirsute branches, flattened and cordiform drupe, terminal and simple racemes, etc.

37. *Monnina decurrens* sp. nov.

Frutex breviter pubescens, ramis 4–20 cm. longis 1.4–2 mm. crassis striatis plus minusve glabrescentibus; folia decurrentia elliptica 1.2–2.8 cm. longa 5–7 mm. lata basi attenuata apice obtusa utrinque glabrescentia integerrima revoluta, nervo medio prominulo, nervis lateralibus 5 vel 6 inconspicuis, petiolo 1.5–2 mm. longo puberulo supra concavo subtus convexo; racemi simplices conici 6–8 mm. crassi subsessiles, rhachi 1.2–2.5 cm. longa breviter puberula striata; bractee ovatae 0.6–1 mm. longae inconspicue uninerviae subtus puberulae ciliatae; flores 4.4–5.2 mm. longi, pedicello 1.6–2.5 mm. longo puberulo; sepala exteriora libera triangularia ciliata concava obtusa subtus puberula, duo inferiora 1.5–1.6 mm. longa 1.4–1.5 mm. lata 3-nervia, sepalo superiore 2–2.2 mm. longo 2–2.3 mm. lato 5-nervio; alae 5.6–6 mm. longae 4.3–4.5 mm. latae obovatae basi plus minusve acutae 5- vel 6-nerviae ciliatae subtus et intus plus minusve puberulae; carina 4.2–5 mm. longa 2.6–3 mm. lata obovata intus puberula apice inconspicue trilobata, lobo mediano emarginato, lobis lateralibus minoribus obtusiusculis, basi acutiuscula 4- vel 5-nervia, petalo superiore elongato spathulato utrinque puberulo; stamina 8, filamentis 3–3.4 mm. longis, antheris subsessilibus, filamentorum parte libera 0.6–1 mm. longa glabra; ovarium 1.2–1.6 mm. longum 1–1.2 mm. latum oblongum dense puberulum; stylus 2.8–3 mm. longus conspicue geniculatus puberulus plus minusve cylindricus; stigma apice superiore tuberculatum papillosum apice inferiore acutum; drupae ellipticae 5–7 mm. longae 2.5–3.2 mm. latae puberulae reticulatae. (PL. IX, FIGS. 1–10.)

DISTRIBUTION: The sierra of northern Perú, Department of Cajamarca, between 2800 and 3000 meters altitude.

PERU: CAJAMARCA: Cordillera east of Huancabamba, Province of Jaén, April, 1912, *Weberbauer* 6100 (TYPE GH, ISOTYPES Ch, US).

This species is near *M. Vitis-Idaea* Chodat but differs in that it does not have a nodose stem, in the larger and conical racemes, the lower sepals being 3-nerved, the ovary and style being conspicuously pubescent, etc.

It is close also to *M. peruviana* Chodat, from which it is distinguished by its smaller, numerous, and elliptical leaves, and by the wings being pubescent within.

38. *Monnina peruviana* Chodat in Bull. Herb. Boiss. 3: 133 (1895).

Frutescent, strongly branched, the branches nodose, 5–7 mm. in diameter, striate, finely pubescent, becoming glabrescent; leaves more or less decurrent, linear-lanceolate, 80–120 mm. long, 16–26 mm. wide, acute, rarely almost obtuse, finely pubescent, entire, attenuate at base, the costa prominulous beneath, with 7 or 8 pairs of lateral veins; petioles 2–6 mm. long, concave above, convex beneath, pubescent; racemes more or less cylindric, acute, 5–7 mm. wide, simple, axillary or terminal, subsessile, the peduncle short, the axis 2.8–6.8 cm. long, 1.5–2.5 mm. in diameter, densely pubescent, striate, bracteate, the bracts ovate-triangular, 2.2–2.8 mm. long, 2–2.2 mm. wide, deciduous, ciliate, 1-nerved, pubescent beneath; flowers 4.2–4.5 mm. long; pedicels 1.2–1.4 mm. long, pubescent; outer sepals free, ovate-lanceolate, obtuse, ciliate, glabrous beneath, the two lower ones 1.8–2 mm. long, 1.6–1.8 mm. wide, 3-nerved, the upper one 2.4–2.5 mm. long, 1.6–1.8 mm. wide, 5-nerved; wings deep blue, 4.4–4.6 mm. long, 3.8–4 mm. wide, obovate, obtuse at base, ciliate, 5- or 6-nerved, glabrous within; keel yellow, 4–4.4 mm. long, 2.5–2.6 mm. wide, orbicular, plicate, densely pubescent within, finely ciliate at base, almost obtuse, 3-lobed, the middle lobe obtuse, slightly emarginate; upper petals spatulate, pubescent; stamens 8, the filaments 3.6–4 mm. long, almost entirely united, the free part 0.8–1 mm. long, glabrous; ovary ellipsoid, 1–1.3 mm. long, 0.6–0.7 mm. wide, densely pubescent, the hairs numerous on the upper part, ascendent, rigid; style 2.6–2.8 mm. long, geniculate in middle part, conspicuously pubescent, cylindric; stigma with 2 lobes, the lower obtuse, the upper 1-tubercled, the tubercle papillose; fruit unknown. (PL. IX, FIGS. 11–19.)

DISTRIBUTION: Northern Perú, probably in the Department of Amazonas.

PERU: DEPT. ? : Without locality, 1862, Mathews without number (NY).

Presumably this entity is endemic to the northern region of the Peruvian Andes. According to the original description, Mathews gave "prope Chachapoyas" as the type-locality; this is situated in the Department of Amazonas. The species has linear-lanceolate leaves, racemes with conspicuous ovate-triangular bracts, and the ovary and style densely pubescent.

39. *Monnina Mathusiana* Chodat in Bull. Herb. Boiss. 3: 134 (1895).

Monnina scandens Chodat in Bot. Jahrb. 42: 98 (1908).

Scandent, branched, the branches slightly hirsute, striate; leaves lanceolate, 35–80 mm. long, 10–30 mm. wide, acute, sometimes more or less acuminate, finely pubescent above, becoming glabrescent, pubescent beneath, entire, attenuate at base, the costa prominulous beneath, with 4 or 5 pairs of lateral veins; petioles 3–4 mm. long; inflorescence paniculate, the axis to 20 cm. long, striate, pubescent, the racemes numerous, lax, bracteate, the bracts filiform, hirsute, deciduous; flowers to 4.5 mm. in diameter, subglobose, with a short pedicel; outer sepals free, ovate-triangular, ciliate, slightly concave, 1- or 3-nerved; wings 3 times larger than the outer sepals, ovate, obtuse; keel yellowish, 3-lobed, the lobes acute; upper petals fan-like, glabrescent; androecium pubescent, the filaments almost entirely

united; ovary glabrous; style straight, becoming geniculate; stigma with 2 lobes, the lower denticulate, the upper 1-tubercled, the tubercle papillose; fruit unknown.

DISTRIBUTION: In the forest of northern Perú, Departments of Amazonas and Cajamarca, between 2700 and 2900 meters altitude.

PERU: AMAZONAS: Chachapoyas, *Mathews 1190* (photograph of the TYPE, Ch); CAJAMARCA: Chugur, Hualgayoc, *Weberbauer 4072* (photograph of type of *M. scandens*, Ch).

I have seen no material of this species other than the cited photographs of the types. The original description of *M. scandens* and also the photograph of its type show the characters of *M. Mathusiana*.

40. *Monnina acutifolia* Chodat in Bull. Soc. Bot. Genève II. 25: 206 (1934).

Shrub, to 30 dm. high, branched, the branches 3–6 mm. in diameter, striate, slightly pubescent, becoming glabrescent, the hairs 0.5–0.8 mm. long; leaves lanceolate, 22–75 mm. long, 7–20 mm. wide, acuminate, sometimes acute, more or less pubescent, becoming glabrescent, entire, attenuate at base, the costa prominulous beneath, with 5 or 6 pairs of lateral veins; petioles 2–7 mm. long, almost cylindric, pubescent; racemes aggregate, sometimes simple, terminal, more or less acute, 8–11 mm. wide, subsessile, the axis 4.5–31 cm. long, pubescent, the hairs 0.5–0.7 mm. long, striate, bracteate, the bracts filiform, deciduous; flowers 4–5.5 mm. long, the pedicels 0.8–1 mm. long, pubescent; outer sepals free, almost triangular, acute, ciliate, pubescent beneath, the two lower ones 2–2.3 mm. long, 1–1.4 mm. wide, 3-nerved, the upper one 2.4–2.5 mm. long, 1.4–1.7 mm. wide, 5-nerved; wings 4–4.4 mm. long, 3.8–4.2 mm. wide, obovate, obtuse at base, 3-nerved, glabrous; keel 4.6–5.5 mm. long, 3–3.2 mm. wide, orbicular, plicate, glabrous, obtuse at base, 3-nerved, 3-lobed, the middle lobe obtuse-emarginate; upper petals elongate, more or less spatulate, pubescent; stamens 8, the filaments 3.2–3.8 mm. long, almost entirely united, the free part 0.6–1.2 mm. long, glabrous; ovary elliptic, 1.2–1.8 mm. long, 0.8–1.2 mm. wide, glabrous; style 2.6–3 mm. long, geniculate above base, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe elliptic-acute, 5–6 mm. long, 2.6–3.5 mm. wide, glabrous, conspicuously reticulate. (PL. IX, FIGS. 20–28.)

DISTRIBUTION: Southern part of the Peruvian Andes, Department of Ayacucho, between 1000 and 2000 meters altitude.

PERU: AYACUCHO: Ccarrapa, between Huanta and Apurimac River, *Killip & Smith 22448* (ISOTYPE Ch), 23228 (Ch, NY, US).

Monnina acutifolia is related to *M. salicifolia* R. & P., from which it differs in the lanceolate and acuminate leaves, the racemes more than 3 times longer, the filiform bracts, the acute-triangular outer sepals, the glabrous wings, etc.

41. *Monnina Vargasii* sp. nov.

Planta herbacea perennis hirsuta, ramis 2–3 mm. crassis striatis conspicue hirsutis; folia lanceolata 4.5–12 cm. longa 1.4–4.2 cm. lata basim versus elongato-attenuata apice plus minusve acuminata utrinque breviter puberula integerrima, nervo medio prominulo, nervis lateralibus 7 vel 8, petiolo 3–7 mm. longo dense puberulo; racemi pauci aggregati (2–3) plus minusve conici 6–9 mm. crassi apice canescenti-tomentosi, rhachi 5–8.2

cm. longa dense puberula subsessili, bracteis lanceolatis 2.6–4.8 mm. longis 0.8–1.2 mm. latis subtus puberulis uninerviis ciliatis; flores 5–6 mm. longi, pedicello 1.2–1.5 mm. longo puberulo tereti; sepala exteriora libera lanceolata ciliata concava subtus puberula, duo inferiora 2.2–2.4 mm. longa 1.5–1.6 mm. lata 3-nervia acuta, sepalo superiore 2.8–3 mm. longo 1.8–2 mm. lato 5-nervio obtuso; alae 6–7 mm. longae 6–6.2 mm. latae obovatae basi obtusae 4- vel 5-nerviae ciliatae utrinque glabrae; carina 6–6.8 mm. longa 4–4.2 mm. lata orbicularis obovata intus glabrescens vel sparse puberula apice trilobata, lobo mediano obtuso emarginato, lobis lateralibus minoribus obtusiusculis, basi obtusa 4- vel 5-nervia, petalo superiore elongato spatulato utrinque puberulo; stamina 8, filamentis 3.6–4 mm. longis, antheris subsessilibus, filamentorum parte libera 0.8–1.6 mm. longa glabra; ovarium 1.6–2.8 mm. longum 1.2–1.6 mm. latum plus minusve puberulum; stylus 3–3.4 mm. longus geniculatus deinde horizontalis glaber; stigma apice superiore tuberculatum papillosum apice inferiore obtusum; fructus ignotus. (PL. IX, FIGS. 29–37.)

DISTRIBUTION: In the southern part of the Peruvian Andes, Department of Apurímac, at about 3300 meters altitude.

PERU: APURIMAC: Bosques de Ampai, Province of Abancay, January–April, 1938, Vargas 771 (TYPE Ch 942479, ISOTYPE GH).

This species is near *M. pilosa* H. B. K., which occurs in northern Perú, from which it differs in its herbaceous habit, lanceolate leaves, and more or less pubescent ovary. It also suggests *M. acutifolia* Chodat, from which it is distinguished by its smaller racemes and the blade of its leaves with 7 or 8 pairs of lateral veins.

It is a pleasure to dedicate this species to Dr. César Vargas, Professor of Botany at the University of Cuzco.

42. *Monnina pilosa* H.B.K. Nov. Gen. et Sp. 5: 419 (1821).

Tree, the branches densely hirsute, terete; leaves oblong, 76–96 mm. long, 32–40 mm. wide, more or less obtuse, sometimes acuminate, densely pubescent, entire, attenuate at base, the costa prominulous beneath, with 7 or 8 pairs of lateral veins; petioles 3.5–5 mm. long, semiterete, pubescent; panicle corymbose, the axis hirsute, lax, bracteate, the bracts pubescent, deciduous; flowers with a short pedicel; outer sepals free, ovate, ciliate, concave, the two lower ones 3-nerved, acute, the upper one 5-nerved, obtuse; wings twice as large as the sepals, fan-like, 7-nerved, glabrous; keel more or less oblong, plicate, pubescent within, glabrous beneath; upper petals short, glabrous; stamens 8, the filaments united in the lower part, the anthers ovate-obtuse; ovary ovoid, glabrous; style thicker in the upper part, geniculate, glabrous; stigma with 2 lobes, the lower denticulate, the upper 1-tubercled, the tubercle papillose; fruit unknown.

DISTRIBUTION: From the Andes of Ecuador and northern Perú, between 1130 and 1700 meters altitude.

ECUADOR: DEPT. ? : Without locality, 1856, Remy without number (fragments US). PERU: PIURA: "prope pagum Ayavacae," without date, "1400 hex.," *Bonpland* 3490 (fragments of TYPE Ch, photograph of TYPE Ch).

The description given above was adapted from the original and also from fragments of the type. This species is distinguished by its dense puberulous indument and by having its panicle more or less corymbose.

42a. *Monnina pilosa* var. *glabrescens* var. nov.

A varietate typica differt indumento paucipiloso et folia majoribus ad 166 mm. longis plus minusve spathulatis acutiusculis. (PL. X, FIGS. 1-10.)

PERU: PIURA: Canchaque, Province of Huancabamba, April 6, 1939, *Stork* 11425 (TYPE GH, ISOTYPE DA, UC).

43. *Monnina densecomata* Chodat in Bull. Soc. Bot. Genève II. 25: 209 (1934).

Shrub, branched, the branches 4-5.5 mm. in diameter, striate, densely pubescent, the hairs 0.6-1 mm. long; leaves elliptic, 36-68 mm. long, 20-40 mm. wide, obtuse, pubescent, becoming more or less glabrescent, entire, revolute, the costa prominulous beneath, with 5 or 6 pairs of lateral veins; petioles 3-6 mm. long, almost cylindric, pubescent; stipules conical, to 3 mm. long, hirsute in the lower part; inflorescence paniculate, the axis 8.5-12.5 cm. long, striate, pubescent, the racemes subsessile, lax, almost acute, 7-9 mm. wide, conspicuously pubescent, bracteate, the bracts lanceolate, 3.6-5 mm. long, 1.6-2 mm. wide, acuminate, densely pubescent beneath, lax, conspicuous; flowers 4.5-5.5 mm. long, the pedicels 0.8-1.2 mm. long, pubescent; outer sepals free, lanceolate, ciliate, pubescent beneath, the two lower ones 3-3.4 mm. long, 1.5-1.6 mm. wide, usually acute, 3-nerved, sometimes 1- or 2-nerved, the upper one 3.2-3.8 mm. long, 1.8-2 mm. wide, more or less obtuse, usually 5-nerved, rarely 3-nerved; wings blue, 4.6-5 mm. long, 4-4.8 mm. wide, obovate, obtuse at base, 4- or 5-nerved, pubescent beneath, ciliate at base; keel yellow, 5.4-6 mm. long, 2.6-3.5 mm. wide, orbicular, plicate, pubescent within, obtuse at base, 3- or 4-nerved, ciliate at base, 3-lobed, the middle lobe obtuse, slightly emarginate; upper petals spatulate, pubescent, the hairs 0.8-1 mm. long; stamens 8, the filaments 3.5-4.2 mm. long, almost entirely united, the free part 0.5-1.2 mm. long, glabrous; ovary ovoid, 1.8-2.2 mm. long, 1.2-1.4 mm. wide, glabrous; style 2-2.8 mm. long, geniculate above base, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe ellipsoid-acute, 4.2-4.6 mm. long, 3-3.2 mm. wide, glabrous, reticulate. (PL. X, FIGS. 11-19.)

DISTRIBUTION: Endemic in the southern part of the Peruvian Andes, Department of Cuzco, between 3800 and 4000 meters altitude.

PERU: Cuzco: Paso de Tres Cruces, Cerro de Cusilluyoc, *Pennell* 13821 (TYPE Ch, ISOTYPES GH, Ph); Paucartambo, *Soukup* 391 (Ch).

Monnina densecomata is characterized by its densely pubescent habit and conspicuously lax racemes, which are pubescent and have lanceolate bracts toward the apex.

44. *Monnina tomentella* Chodat in Bull. Soc. Bot. Genève II. 25: 210 (1934).

Shrub, branched, the branches divaricate, 2.5-3 mm. in diameter, strongly ligneous, densely canescent-pubescent, the hairs 1-1.2 mm. long, yellow, lax; leaves elliptic or lanceolate, sometimes more or less oblanceolate, 27-82 mm. long, 14-40 mm. wide, obtuse, conspicuously tomentose, entire, the costa prominulous beneath, with 4 or 5 pairs of lateral veins; petioles 2-5 mm. long, concave above, convex beneath, pubescent; inflorescence paniculate, semicorymbose, the axis 10-18 cm. long, canescent-tomentose, the racemes subsessile, with an obtuse apex, 8-10 mm. wide, tomentose, bracteate, the bracts lanceolate, 3-4 mm. long, 0.8-1 mm. wide,

acuminate, densely pubescent beneath, 1-nerved; flowers 4.4–4.6 mm. long, the pedicels 1–1.2 mm. long, pubescent; outer sepals free, more or less lanceolate, ciliate, concave, acute, densely pubescent beneath, the two lower ones 2–2.2 mm. long, 1.3–1.4 mm. wide, 3-nerved, the upper one 2.4–3 mm. long, 1.6–1.8 mm. wide, 5-nerved; wings 4.8–5 mm. long, 4–4.2 mm. wide, suborbicular, obtuse at base, 3-nerved, densely pubescent beneath, more or less pubescent within, ciliate; keel 4.8–5 mm. long, 2.5–2.6 mm. wide, orbicular, plicate, glabrous within, obtuse at base, 3- or 4-nerved, glabrous at margin, 3-lobed, the middle lobe obtuse-emarginate; upper petals elongate, spatulate, densely pubescent; stamens 8, the filaments 3.2–3.8 mm. long, pubescent (hairs 1.2–1.5 mm. long, lax, yellow), almost entirely united, the free part 1–1.4 mm. long, glabrous; ovary ovoid, 1.2–1.8 mm. long, 0.6–0.8 mm. wide, glabrous; style 2.5–2.8 mm. long, geniculate, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe more or less ellipsoid, subacute, 4.5–5 mm. long, 2.4–2.6 mm. wide, glabrous, almost truncate at base, reticulate. (PL. X, FIGS. 20–28.)

DISTRIBUTION: In the sierra of northern Perú, Department of Piura, between 2600 and 2700 meters altitude.

PERU: PIURA: Above Huancabamba, eastern cordillera, *Weberbauer 6139* (TYPE Ch, ISOTYPE GH).

This plant is closely related to *M. densecomata* Chodat, of southern Perú, from which it differs in the following characters: leaves not revolute, the apex more or less attenuate, the racemes ascendent, larger and almost rigid, the upper sepals acute, the wings more or less pubescent within, and the keel glabrous within.

45. *Monnina* *Herrerae* sp. nov.

Frutex pubescens, ramis 2.8–3 mm. crassis lignosis conspicue pilosis, pilis 0.6–0.8 mm. longis laxis flavescentibus; folia lanceolata 4.5–9 cm. longa 1.5–3 cm. lata basim versus elongato-attenuata apice acuta, supra plus minusve puberula, subtus flavescenti-puberula, integerrima, nervo medio prominulo conspicue puberulo, nervis lateralibus 6 vel 7, petiolo 4.5–7 mm. longo flavescenti-puberulo; racemi simplices vel aggregati plus minusve acuminati 7–10 mm. crassi, rhachi 6–7.8 cm. longa puberula, pedunculo 5–12 mm. longo, bracteis lineari-lanceolatis 3.8–5 mm. longis 1.2–1.4 mm. latis subtus puberulis uninerviis ciliatis; flores 4.8–5.2 mm. longi, pedicello 1–1.2 mm. longo puberulo; sepala exteriora libera lanceolata ciliata concava acuta subtus puberula, duo inferiora 2.8–3 mm. longa 1.5–1.7 mm. lata uninervia, sepalo superiore 3.2–3.5 mm. longo 2–2.2 mm. lato 3–5-nervio; alae 5–5.6 mm. longae 5–5.2 mm. latae obovatae basi obtusae 4- vel 5-nerviae ciliatae utrinque glabrae; carina 5–6 mm. longa 3.2–3.6 mm. lata orbicularis obovata utrinque glabra apice trilobata, lobo mediano obtuso emarginato, lobis lateralibus minoribus obtusiusculis, basi obtusa 3- vel 4-nervia, petalo superiore spatulato utrinque puberulo; stamina 8, filamentis 3.8–4.2 mm. longis, antheris subsessilibus, filamentorum parte libera 0.7–1.4 mm. longa glabra; ovarium 1.2–1.5 mm. longum 0.7–0.9 mm. latum ovatum glabrum; stylus 2.8–3.2 mm. longus geniculatus glaber; stigma apice superiore tuberculatum papillosum apice inferiore acutum; fructus ignotus. (PL. X, FIGS. 29–37.)

DISTRIBUTION: Andes of southern Perú, Department of Apurimac, at about 3400 meters altitude.

PERU: APURIMAC: Between Río Pinkos and Río Apurimac, June 11, 1911, *Weberbauer 5864* (TYPE GH).

The new species is related to *M. Vargasii* Ferreyra, from which it is distinguished by its conspicuously woody branches, its smaller leaves, which are acute at the apex, its 1-nerved lower sepals, its glabrous ovary, etc. From *M. pachycoma* Chodat, another ally, *M. Herrerae* differs in its larger and acute leaves and its much smaller outer sepals, which are 1-nerved and densely pubescent beneath.

The writer is honored to name this interesting species after Dr. Fortunato L. Herrera, the late distinguished Professor of Botany at the Universities of Cuzco and San Marcos, whose unremitting efforts toward making known the flora of Cuzco are appreciated by his many colleagues.

46. *Monnina pachycoma* Chodat in Bull. Soc. Bot. Genève II. 25: 220 (1934).

Shrub, to 20 dm. high, branched, the branches 2–3.5 mm. in diameter, densely pubescent, the hairs 0.8–1.2 mm. long, yellow, lax; leaves lanceolate, sometimes more or less elliptic, 18–60 mm. long, 8–21 mm. wide, obtuse, rarely slightly mucronate, pubescent above, becoming glabrescent, conspicuously pubescent beneath, entire, rarely slightly revolute, the costa prominulous beneath, with 5 or 6 pairs of lateral veins; petioles 2.5–4.5 mm. long, concave above, convex beneath, pubescent; stipules densely hirsute; racemes aggregated, sometimes simple, terminal, almost conical, acute, 11–16 mm. wide, subsessile, the axis 3.5–10 cm. long, densely pubescent, bracteate, the bracts linear-lanceolate, conspicuous, 5–6.5 mm. long, 0.4–0.5 mm. wide, acuminate, pubescent beneath, ciliate, 1-nerved, deciduous; flowers 6–6.8 mm. long, the pedicels 1.5–2 mm. long, pubescent; outer sepals free, lanceolate, ciliate, concave, glabrous beneath, the two lower ones 5.6–6.8 mm. long, 2.3–2.6 mm. wide, 3-nerved, the apex involute, acute, the upper one 6–7 mm. long, 2.8–3 mm. wide, 5–7-nerved, obtuse, the apex slightly involute; wings deep blue, 6.5–7 mm. long, 5.5–6.4 mm. wide, almost elliptic, obtuse at base, 3-nerved, rarely 4- or 5-nerved, glabrous, ciliate at the base; keel yellow, 6–8 mm. long, 3.8–4 mm. wide, orbicular, plicate, glabrous within, obtuse at base, 3–5-nerved, ciliate at base, 3-lobed, the middle lobe obtuse-emarginate, larger; upper petals spatulate, pubescent; stamens 8, the filaments 4.6–5 mm. long, pubescent, almost entirely united, the free part 1–1.5 mm. long, glabrous; ovary ovoid, 2–2.2 mm. long, 1.4–1.5 mm. wide, glabrous; style 2.8–3 mm. long, geniculate above base, glabrous, cylindric; stigma with 2 lobes, the lower acute, the upper 1-tubercled, the tubercle papillose; drupe ellipsoid, 6–9 mm. long, 3.5–5 mm. wide, glabrous, more or less reticulate. (PL. X, FIGS. 38–46.)

DISTRIBUTION: Southeastern part of the Peruvian Andes, Department of Cuzco, between 3500 and 3900 meters altitude.

PERU: Cuzco: Paso de Tres Cruces, Cerro de Cusilluyoc, *Pennell 13834* (ISOTYPES Ch, GH, Ph), 13823 (Ch, GH, NY, Ph, US); Acanacu Pass, Province of Paucartambo, *West 7036* (GH, UC).

The conspicuous outer sepals with their strongly involute apex characterize this species.

EXCLUDED SPECIES

Monnina calophylla Poepp. & Endl. Nov. Gen. ac Sp. 3: 66 (1835) = *Securidaca Corytholobium* A. W. Benn.

DOUBTFUL SPECIES

Monnina polygaloides Chodat in Mém. Soc. Phys. Hist. Nat. Genève, Suppl. 7: t. 9, f. 5 (1891).

The cited figure illustrates a pistil, but I have been able to find no subsequent mention of this binomial.

Monnina nitida Chodat in Bull. Herb. Boiss. 3: 130 (1895).

This species, based upon a specimen collected by Pavón in Perú, without other locality, cannot be placed from the description alone. Concerning it, Chodat writes: "Racemi elongati, bracteis et foliis nitidis primo aspectu cognoscenda."

Monnina rugosa Chodat in Bull. Herb. Boiss. 4: 251 (1896).

I am unable accurately to place this species, which is based upon a plant collected in Perú (without other data). The author writes: "Indumento affinis *M. Rusbyi* Chod. differt alis haud distincte unguiculatis, antheris distincte petiolatis, habitu robustiore, etiam affinis *M. cariocarphae* St-Hil., differt foliis irregulariter denticulatis et indumento crassiore."

UNIVERSIDAD MAYOR DE SAN MARCOS,
LIMA, PERÚ

EXPLANATION OF PLATES

PLATE I

FIGS. 1-11. *Monnina pterocarpa* R. & P. (Macbride 2874): 1. habit, $\times \frac{1}{2}$; 2, 3. lower sepals, $\times 8$; 4. upper sepal, $\times 8$; 5, 6. wings, $\times 8$; 7. keel, $\times 8$; 8, 9. androecium and upper petals, $\times 8$; 10. ovary and style, $\times 8$; 11. samara, $\times 4$. FIGS. 12-22. *Monnina amarella* Chodat (Pennell 13629): 12. habit, $\times 1$; 13, 14. lower sepals, $\times 8$; 15. upper sepal, $\times 8$; 16, 17. wings, $\times 8$; 18. keel, $\times 8$; 19, 20. androecium and upper petals, $\times 8$; 21. ovary and style, $\times 8$; 22. samara, $\times 8$. FIGS. 23-33. *Monnina filifolia* Chodat (Weberbauer 6454): 23. habit, $\times \frac{1}{2}$; 24, 25. lower sepals, $\times 8$; 26. upper sepal, $\times 8$; 27, 28. wings, $\times 8$; 29. keel, $\times 8$; 30, 31. androecium and upper petals, $\times 8$; 32. ovary and style, $\times 8$; 33. samara, $\times 6$. FIGS. 34-43. *Monnina herbacea* DC. (Macbride 3181): 34. habit, $\times \frac{1}{2}$; 35, 36. lower sepals, $\times 8$; 37. upper sepal, $\times 8$; 38, 39. wings, $\times 8$; 40. keel, $\times 8$; 41. androecium and upper petals, $\times 8$; 42. ovary and style, $\times 8$; 43. fruit, $\times 8$.



THE PERUVIAN SPECIES OF MONNINA

PLATE II

FIGS. 1-10. *Monnina ramosa* Johnston (*Hinkley 13*): 1. habit, $\times 1$; 2, 3. lower sepals, $\times 8$; 4. upper sepal, $\times 8$; 5, 6. wings, $\times 8$; 7. keel, $\times 8$; 8. androecium and upper petals, $\times 8$; 9. ovary and style, $\times 8$; 10. samara, $\times 8$. FIGS. 11-20. *Monnina Macbridei* Chodat (*Pennell 13110*): 11. habit, $\times 1$; 12, 13. lower sepals, $\times 8$; 14. upper sepal, $\times 8$; 15, 16. wings, $\times 8$; 17. keel, $\times 8$; 18. androecium and upper petals, $\times 8$; 19. ovary and style, $\times 8$; 20. samara, $\times 8$. FIGS. 21-30. *Monnina arenicola* Ferreyra (*Mexia 4175*): 21. habit, $\times 1$; 22, 23. lower sepals, $\times 8$; 24. upper sepal, $\times 8$; 25, 26. wings, $\times 8$; 27. keel, $\times 8$; 28. androecium and upper petals, $\times 8$; 29. ovary and style, $\times 8$; 30. samara, $\times 8$. FIGS. 31-41. *Monnina Weberbaueri* Chodat (*Grant 7440*): 31. habit, $\times 1$; 32, 33. lower sepals, $\times 8$; 34. upper sepal, $\times 8$; 35, 36. wings, $\times 8$; 37. keel, $\times 8$; 38, 39. androecium and upper petals, $\times 8$; 40. ovary and style, $\times 8$; 41. fruit, $\times 8$.



THE PERUVIAN SPECIES OF MONNINA

PLATE III

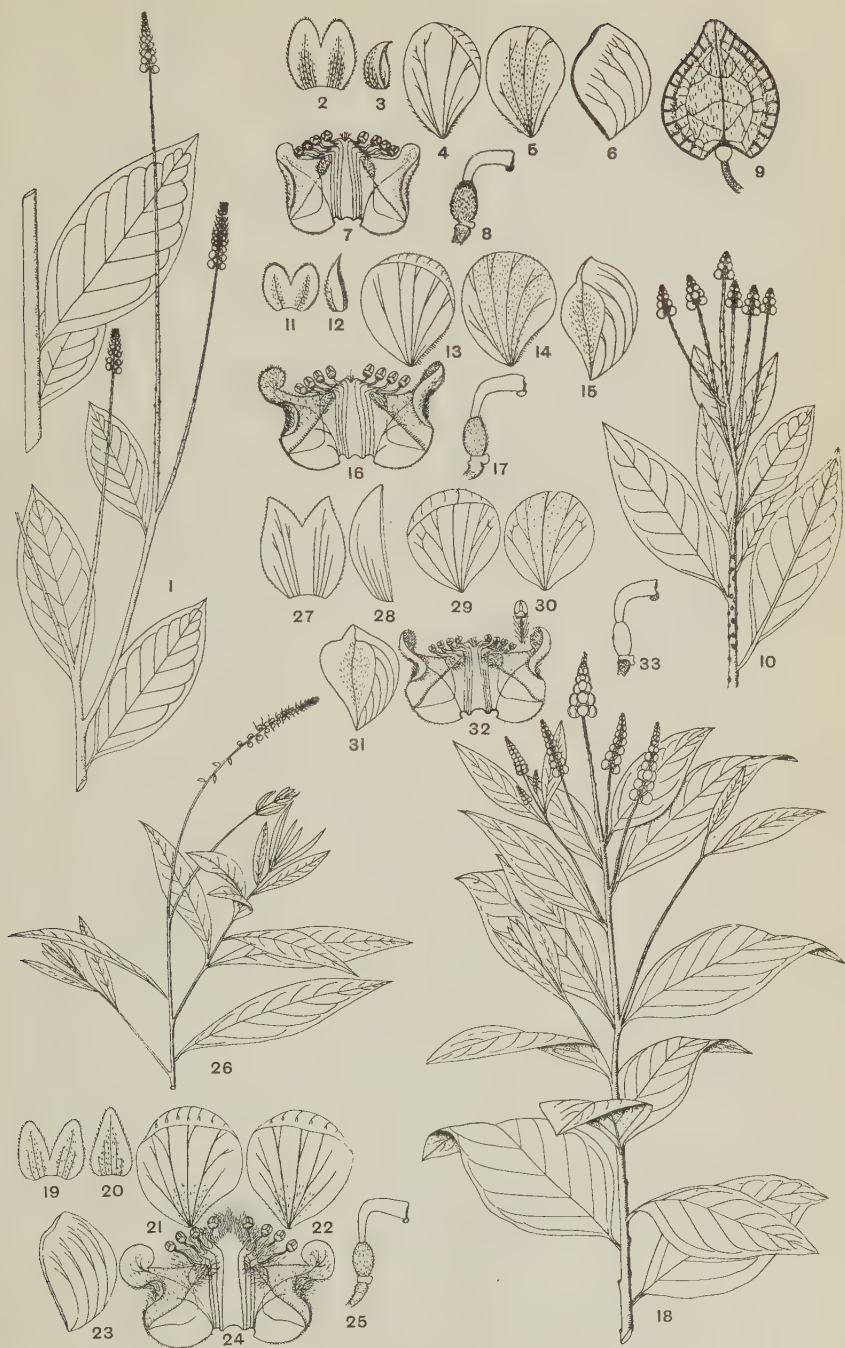
FIGS. 1-10. *Monnina macrostachya* R. & P. (Pennell 14436): 1. habit, $\times \frac{1}{2}$; 2, 3. lower sepals, $\times 8$; 4. upper sepal, $\times 8$; 5, 6. wings, $\times 8$; 7. keel, $\times 8$; 8. androecium and upper petals, $\times 8$; 9. ovary and style, $\times 8$; 10. samara, $\times 8$. FIGS. 11-17. *Monnina longibracteata* Chodat (Mathews 2075): 11. lower sepals, $\times 8$; 12. upper sepal, $\times 8$; 13, 14. wings, $\times 8$; 15. keel, $\times 8$; 16. androecium and upper petals, $\times 8$; 17. ovary and style $\times 8$. FIGS. 18-25. *Monnina longibracteata* var. *ainensis* Chodat (Killip & Smith 23188): 18. habit, $\times \frac{1}{2}$; 19. lower sepals, $\times 6$; 20. upper sepal, $\times 6$; 21, 22. wings, $\times 6$; 23. keel, $\times 6$; 24. androecium and upper petals, $\times 6$; 25. ovary and style, $\times 6$. FIGS. 26-33. *Monnina huallagensis* Chodat (Weberbauer 6805): 26. habit, $\times \frac{1}{2}$; 27. lower sepals, $\times 8$; 28. upper sepal, $\times 8$; 29, 30. wings, $\times 8$; 31. keel, $\times 8$; 32. androecium and upper petals, $\times 8$; 33. ovary and style, $\times 8$. FIG. 34. *Monnina huallagensis* var. *pachyphylla* Chodat (Macbride 4786): habit, $\times 1$.



THE PERUVIAN SPECIES OF MONNINA

PLATE IV

FIGS. 1-9. *Monnina glabrifolia* Ferreyra (*Metcalf* 30661): 1. habit, $\times \frac{1}{2}$; 2. lower sepals, $\times 6$; 3. upper sepal, $\times 6$; 4, 5. wings, $\times 6$; 6. keel, $\times 6$; 7. androecium and upper petals, $\times 6$; 8. ovary and style, $\times 6$; 9. drupe, $\times 6$. FIGS. 10-17. *Monnina marginata* Presl (*Kanehira* 190): 10. habit, $\times 1$; 11. lower sepals, $\times 6$; 12. upper sepal, $\times 6$; 13, 14. wings, $\times 6$; 15. keel, $\times 6$; 16. androecium and upper petals, $\times 6$; 17. ovary and style, $\times 6$. FIGS. 18-25. *Monnina pseudo-salicifolia* Ferreyra (*Weberbauer* 6055): 18. habit, $\times 1$; 19. lower sepals, $\times 6$; 20. upper sepal, $\times 6$; 21, 22. wings, $\times 6$; 23. keel, $\times 6$; 24. androecium and upper petals, $\times 6$; 25. ovary and style, $\times 6$. FIGS. 26-33. *Monnina macrosepala* Chodat (*C. Schunke* 487): 26. habit, $\times \frac{1}{2}$; 27. lower sepals, $\times 6$; 28. upper sepal, $\times 6$; 29, 30. wings, $\times 6$; 31. keel, $\times 6$; 32. androecium and upper petals, $\times 6$; 33. ovary and style, $\times 6$.



THE PERUVIAN SPECIES OF MONNINA

PLATE V

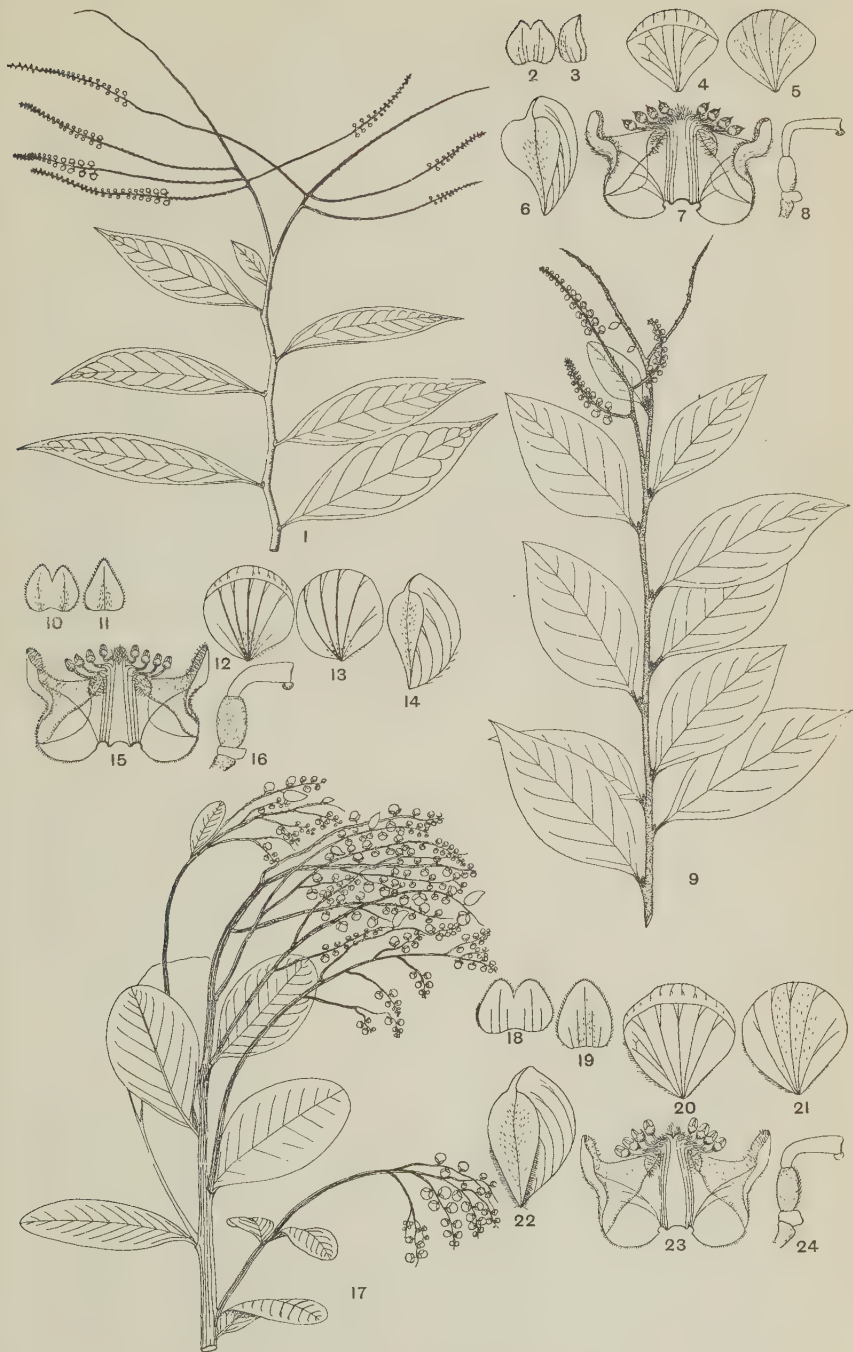
FIGS. 1-8. *Monnina Vitis-Idaea* Chodat (*Weberbauer 6129*): 1. habit, $\times 1$; 2. lower sepals, $\times 6$; 3. upper sepal, $\times 6$; 4, 5. wings, $\times 6$; 6. keel, $\times 6$; 7. androecium and upper petals, $\times 6$; 8. ovary and style, $\times 6$. FIGS. 9-16. *Monnina conferta* R. & P. (*Weberbauer 5488*): 9. habit, $\times 1$; 10. lower sepals, $\times 6$; 11. upper sepal, $\times 6$; 12, 13. wings, $\times 6$; 14. keel, $\times 6$; 15. androecium and upper petals, $\times 6$; 16. ovary and style, $\times 6$. FIGS. 17-24. *Monnina stipulata* Chodat (*Metcalf 30511*): 17. habit, $\times 1$; 18. lower sepals, $\times 6$; 19. upper sepal, $\times 6$; 20, 21. wings, $\times 6$; 22. keel, $\times 6$; 23. androecium and upper petals, $\times 6$; 24. ovary and style, $\times 6$. FIGS. 25-32. *Monnina canescens* Ferreyra (*Pennell 14376*): 25. habit, $\times 1$; 26. lower sepals, $\times 6$; 27. upper sepal, $\times 6$; 28, 29. wings, $\times 6$; 30. keel, $\times 6$; 31. androecium and upper petals, $\times 6$; 32. ovary and style, $\times 6$.



THE PERUVIAN SPECIES OF MONNINA

PLATE VI

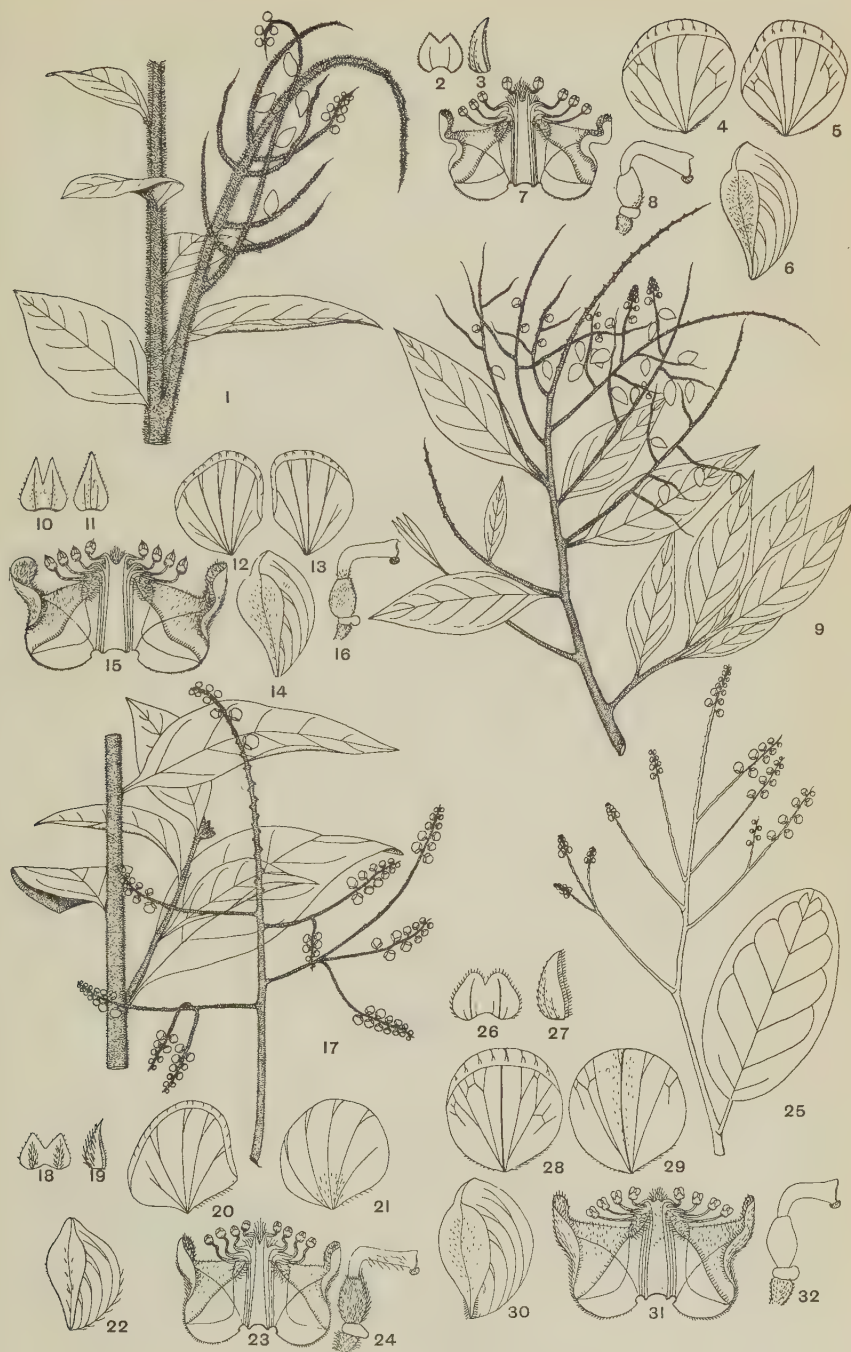
FIGS. 1-8. *Monnina divaristachya* Ferreyra (*Killip & Smith 25778*): 1. habit, $\times \frac{1}{2}$; 2. lower sepals, $\times 6$; 3. upper sepal, $\times 6$; 4, 5. wings, $\times 6$; 6. keel, $\times 6$; 7. androecium and upper petals, $\times 6$; 8. ovary and style, $\times 6$. FIGS. 9-16. *Monnina callimorpha* Chodat (*Killip & Smith 24421*): 9. habit, $\times 1$; 10. lower sepals, $\times 6$; 11. upper sepal, $\times 6$; 12, 13. wings, $\times 6$; 14. keel, $\times 6$; 15. androecium and upper petals, $\times 6$; 16. ovary and style, $\times 6$. FIGS. 17-24. *Monnina ovata* Ferreyra (*Macbride 4493*): 17. habit, $\times 1$; 18. lower sepals, $\times 6$; 19. upper sepal, $\times 6$; 20, 21. wings, $\times 6$; 22. keel $\times 6$; 23. androecium and upper petals, $\times 6$; 24. ovary and style, $\times 6$.



THE PERUVIAN SPECIES OF MONNINA

PLATE VII

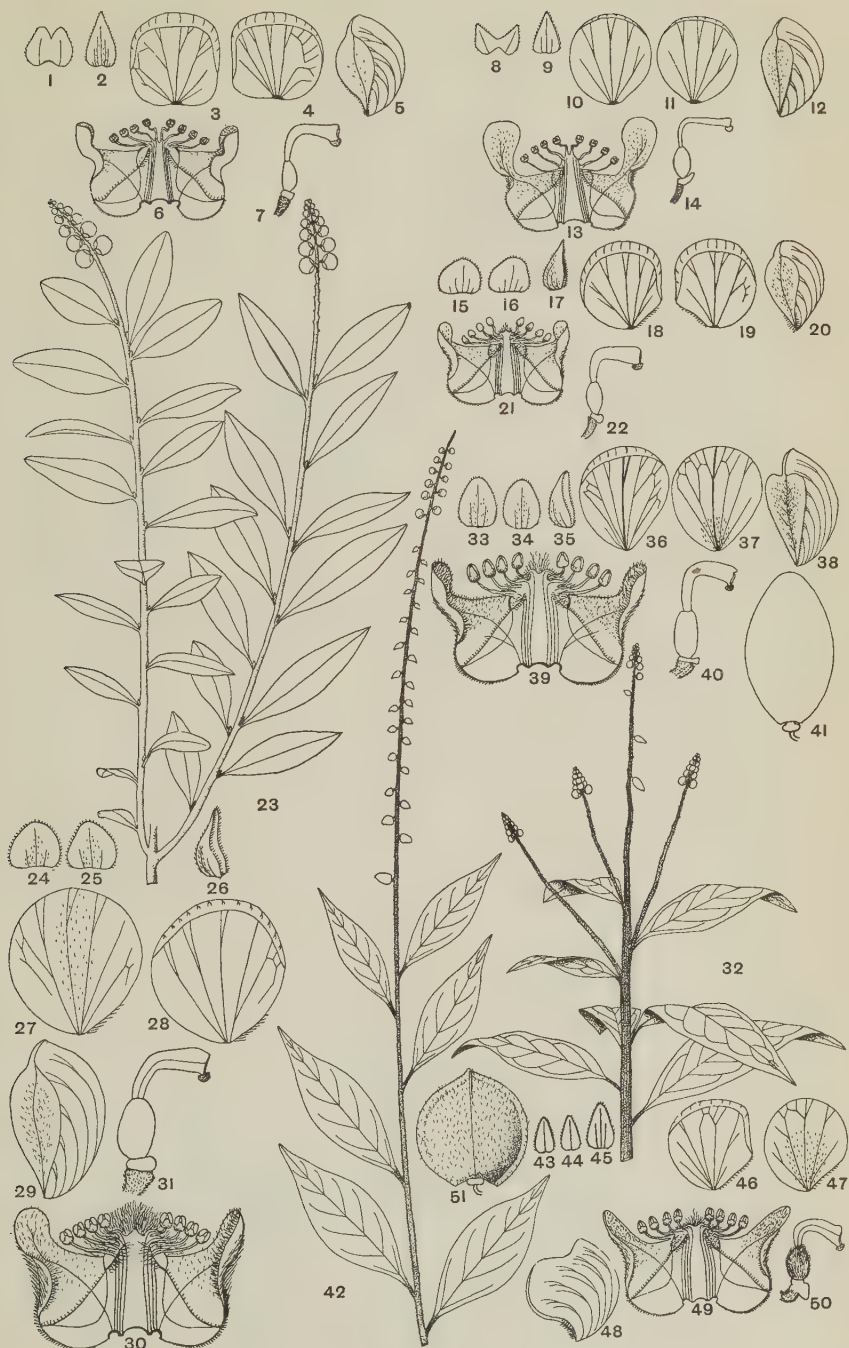
FIGS. 1-8. *Monnina polystachya* R. & P. (Macbride & Featherstone 1848): 1. habit, $\times 1$; 2. lower sepals, $\times 6$; 3. upper sepal, $\times 6$; 4, 5. wings, $\times 6$; 6. keel, $\times 6$; 7. androecium and upper petals, $\times 6$; 8. ovary and style, $\times 6$. FIGS. 9-16. *Monnina Pavoni* Chodat (Macbride 4124): 9. habit, $\times 1$; 10. lower sepals, $\times 6$; 11. upper sepal, $\times 6$; 12, 13. wings, $\times 6$; 14. keel, $\times 6$; 15. androecium and upper petals, $\times 6$; 16. ovary and style, $\times 6$. FIGS. 17-24. *Monnina pseudo-polystachya* Chodat (Macbride 4317): 17. habit, $\times 1$; 18. lower sepals, $\times 6$; 19. upper sepal, $\times 6$; 20, 21. wings, $\times 6$; 22. keel, $\times 6$; 23. androecium and upper petals, $\times 6$; 24. ovary and style, $\times 6$. FIGS. 25-32. *Monnina connectisepala* Chodat (Pennell 13977): 25. habit, $\times 1$; 26. lower sepals, $\times 6$; 27. upper sepal, $\times 6$; 28, 29. wings, $\times 6$; 30. keel, $\times 6$; 31. androecium and upper petals, $\times 6$; 32. ovary and style, $\times 6$.



THE PERUVIAN SPECIES OF *MONNINA*

PLATE VIII

FIGS. 1-7. *Monnina Lechleriana* Chodat (Lechler 2072): 1. lower sepals, $\times 6$; 2. upper sepal, $\times 6$; 3, 4. wings, $\times 6$; 5. keel, $\times 6$; 6. androecium and upper petals, $\times 6$; 7. ovary and style, $\times 6$. FIGS. 8-14. *Monnina Clarkeana* Chodat (Mathews 1192): 8. lower sepals, $\times 6$; 9. upper sepal, $\times 6$; 10, 11. wings, $\times 6$; 12. keel, $\times 6$; 13. androecium and upper petals, $\times 6$; 14. ovary and style, $\times 6$. FIGS. 15-22. *Monnina ligustriifolia* H.B.K. (Bonpland 3491): 15, 16. lower sepals, $\times 6$; 17. upper sepal, $\times 6$; 18, 19. wings, $\times 6$; 20. keel, $\times 6$; 21. androecium and upper petals, $\times 6$; 22. ovary and style, $\times 6$. FIGS. 23-31. *Monnina salicifolia* R. & P. (Stork & Horton 9375): 23. habit, $\times 1$; 24, 25. lower sepals, $\times 6$; 26. upper sepal, $\times 6$; 27, 28. wings, $\times 6$; 29. keel, $\times 6$; 30. androecium and upper petals, $\times 6$; 31. ovary and style, $\times 6$. FIGS. 32-41. *Monnina hirtella* Ferreyra (Klug 3337): 32. habit, $\times 1$; 33, 34. lower sepals, $\times 6$; 35. upper sepal, $\times 6$; 36, 37. wings, $\times 6$; 38. keel, $\times 6$; 39. androecium and upper petals, $\times 6$; 40. ovary and style, $\times 6$; 41. drupe, $\times 6$. FIGS. 42-51. *Monnina cyanea* Chodat (Weberbauer 7835): 42. habit, $\times 1$; 43, 44. lower sepals, $\times 6$; 45. upper sepal, $\times 6$; 46, 47. wings, $\times 6$; 48. keel, $\times 6$; 49. androecium and upper petals, $\times 6$; 50. ovary and style, $\times 6$; 51. fruit, $\times 6$.



THE PERUVIAN SPECIES OF MONNINA

PLATE IX

FIGS. 1-10. *Monnina decurrens* Ferreyra (Weberbauer 6100): 1. habit, $\times 1$; 2, 3. lower sepals, $\times 6$; 4. upper sepal, $\times 6$; 5, 6. wings, $\times 6$; 7. keel, $\times 6$; 8. androecium and upper petals, $\times 6$; 9. ovary and style, $\times 6$; 10. drupe, $\times 6$. FIGS. 11-19. *Monnina peruviana* Chodat (Mathews without number): 11. habit, $\times 1$; 12, 13. lower sepals, $\times 6$; 14. upper sepal, $\times 6$; 15, 16. wings, $\times 6$; 17. keel, $\times 6$; 18. androecium and upper petals, $\times 6$; 19. ovary and style, $\times 6$. FIGS. 20-28. *Monnina acutifolia* Chodat (Killip & Smith 22448): 20. habit, $\times 1$; 21, 22. lower sepals, $\times 6$; 23. upper sepal, $\times 6$; 24, 25. wings, $\times 6$; 26. keel, $\times 6$; 27. androecium and upper petals, $\times 6$; 28. ovary and style, $\times 6$. FIGS. 29-37. *Monnina Vargasii* Ferreyra (Vargas 771): 29. habit, $\times 1$; 30, 31. lower sepals, $\times 6$; 32. upper sepal, $\times 6$; 33, 34. wings, $\times 6$; 35. keel, $\times 6$; 36. androecium and upper petals, $\times 6$; 37. ovary and style, $\times 6$.



THE PERUVIAN SPECIES OF MONNINA

PLATE X

FIGS. 1-10. *Monnina pilosa* var. *glabrescens* Ferreyra (Stork 11425): 1. habit, $\times \frac{1}{2}$; 2, 3. lower sepals, $\times 6$; 4. upper sepal, $\times 6$; 5, 6. wings, $\times 6$; 7. keel, $\times 6$; 8. androecium and upper petals, $\times 6$; 9. ovary and style, $\times 6$; 10. bract, $\times 6$. FIGS. 11-19. *Monnina densecomata* Chodat (Pennell 13821): 11. habit, $\times 1$; 12, 13. lower sepals, $\times 6$; 14. upper sepal, $\times 6$; 15, 16. wings, $\times 6$; 17. keel, $\times 6$; 18. androecium and upper petals, $\times 6$; 19. ovary and style, $\times 6$. FIGS. 20-28. *Monnina tomentella* Chodat (Weberbauer 6139): 20. habit, $\times \frac{1}{2}$; 21, 22. lower sepals, $\times 6$; 23. upper sepal, $\times 6$; 24, 25. wings, $\times 6$; 26. keel, $\times 6$; 27. androecium and upper petals, $\times 6$; 28. ovary and style, $\times 6$. FIGS. 29-37. *Monnina Herrerae* Ferreyra (Weberbauer 5864): 29. habit, $\times 1$; 30, 31. lower sepals, $\times 6$; 32. upper sepal, $\times 6$; 33, 34. wings, $\times 6$; 35. keel, $\times 6$; 36. androecium and upper petals, $\times 6$; 37. ovary and style, $\times 6$. FIGS. 38-46. *Monnina pachycoma* Chodat (Pennell 13834): 38. habit, $\times 1$; 39, 40. lower sepals, $\times 6$; 41. upper sepal, $\times 6$; 42, 43. wings, $\times 6$; 44. keel, $\times 6$; 45. androecium and upper petals, $\times 6$; 46. ovary and style, $\times 6$.



THE PERUVIAN SPECIES OF *MONNINA*

NOTES ON SOME CULTIVATED TREES AND SHRUBS, III*

ALFRED REHDER

- Chamaecyparis Lawsoniana* (A. Murr.) Parl. f. *glaucescens* [Otto], comb. nov.
Cupressus Lawsoniana erecta glaucescens Sieb. ex [Otto in] Hamburg. Gart.- & Blumenzeit. 24: 141 (1868), non *C. L.* var. *erecta* Jäger (1865).
Cupressus Lawsoniana erecta glauca R. Smith, Pl. Fir Tribe, 15 [1874?].
Chamaecyparis Lawsoniana var. *erecta glauca* Beissner in Jäger & Beissner, Ziergeh. ed. 2, 451 (1884). — Schneider in Silva Tarouca, Uns. Freil.-Nadelh. 168 (1913) "var. *pyramidalis* f. *e.* subf. *g.*" — Non *C. L.* var. *erecta* (Jäg.) Schneid. (1913).
Chamaecyparis Lawsoniana erecta glaucifolia Sudworth in U. S. Dept. Agric. For. Serv. Bull. 14: 83 (Nomencl. Arb. Fl. U. S.) (1897).
Chamaecyparis Lawsoniana var. *monumentalis nova* [hort. ex] Schneider in Silva Tarouca, Uns. Freil.-Nadelh. 168 (1913), pro syn.
Chamaecyparis Lawsoniana var. *erecta-glauca* Rehder, Man. Cult. Trees Shrubs, 18 (1927).

The varietal epithet "*glaucescens*," published by Otto in 1868 in a quaternary combination, is apparently the oldest available epithet for this form; the other epithet, "*erecta*," is preoccupied by *erecta* in the combination *Cupressus Lawsoniana* var. *erecta* Jäger, Ziergeh. 200 (1865).

Corylaceae Mirbel, Elém. Phys. Vég. 2: 906 (1815), exclud. *Fagus*; emend. — Fernald in Rhodora, 47: 303 (1945), nom.

Amentaceae P. F. Gmelin, Otia Bot. 49, 90 (1760), p. p.

Betulaceae Bartling, Ord. Nat. Pl. 99 (1830), sensu stricto. — Horaninov, Prim. Lin. Syst. Nat. 63 (1834), sensu stricto. — A. Br. in Ascherson, Fl. Prov. Brandenb. 618 (1864). — Winkler in Engler, Pflanzenreich, IV. 61 (Heft 19): 1-149, fig. 1-28, t. 1-2 (1904).

Trib. I. Betuleae [Dumort.], comb. nov.

Salicineae Mirbel, Elém. Phys. Vég. 2: 905 (1815), p. p. quoad sect. II.

Amentaceae b. Betulaceae C. A. Agardh, Aphor. Bot. 208 (1825). — Dumortier in Bijdr. Natuurk. Wetensch. 1: 45 (Verh. Wilg. 4) (1825) "Afd. 1."; Florula Belg. 11 (1827) "trib. Betuleae."

Betulaceae Bartling, Ord. Nat. Pl. 99 (1830), sensu stricto. — Regel in Nouv. Mém. Soc. Nat. Moscou, 13,2: 63 (Monog. Betul. 5) (1861).

Xylophyta 1. Betuleae Döll, Erklär. Laubkn. Ament. 10 (1848).

Betulaceae trib. Betuleae Ascherson, Fl. Prov. Brandenb. 619 (1864). — Winkler in Engler, Pflanzenreich, IV. 61 (Heft 19): 56 (1904).

Castanacées I. Betuleae Baillon, Hist. Pl. 6: 254 (1877).

Cupuliferae trib. I. Betuleae Benthams & Hooker f., Gen. Pl. 3: 403 (1880).

Betulaceae trib. Alneae et Betuleae Nakai, Fl. Sylv. Kor. 2: 7 (1915).

Trib. II. Coryleae (Meissn.), comb. nov.

Corylaceae Mirbel, Elém. Phys. Vég. 2: 906 (1815), exclud. *Fagus*. — Horaninov, Prim. Lin. Syst. Nat. 63 (1834), p. p. typ. — Lindley, Veg. Kingd. 290 (1846), p. p. typ. — A. de Candolle in De Candolle, Prodr. 16,2: 124 (1864).

Amentaceae d. Corylaceae Agardh, Aphor. Bot. 208 (1825), p. p. quoad *Corylus*.

Cupuliferae trib. Corylaceae Dumortier, Florula Belg. 14 (1827). — Meissner, Pl. Vasc. Gen. 1: 346 [1842] "trib. Coryleae."

Xylophyta 2. Carpineae Döll, Erklär. Laubkn. Ament. 15 (1848) "Carpineen."

* For nos. I and II see vol. 26, pp. 67 and 472.

Betulaceae trib. *Coryleae* Ascherson, Fl. Prov. Brandenb. 618 (1864).

Corylaceae trib. *Carpineae* et trib. *Coryleae* A. de Candolle in De Candolle, Prodr. 16, 2: 124, 128 (1864).

Castanacées II. *Coryleae* Baillon, Hist. Pl. 6: 255 (1877).

Betulaceae trib. *Coryleae* (Meissn.) et trib. *Carpineae* (Döll) Nakai, Fl. Sylv. Kor. 2: 7 (1915).

As is shown by the synonymy given above, the oldest name for the family called *Betulaceae* should bear, according to the rules of priority, the name *Corylaceae*, as called recently by Fernald, though without any explanation or reference to earlier publications. The first author to unite the group published in 1815 by Mirbel as *Corylaceae* and that published in 1830 by Bartling as *Betulaceae* was apparently A. Braun, in Ascherson in 1864 (l.c.), who unfortunately chose Bartling's later name as the name for the amplified family, possibly because Mirbel had included *Fagus* in his *Corylaceae*, although the name shows that the family is based on *Corylus*. The acceptance of *Corylaceae* as the name of the family makes necessary new combinations for the two tribes into which this family is usually divided.

Amelanchier arborea (Michx. f.) Fern. f. *nuda* (Palmer & Steyermark), comb. nov.
Amelanchier canadensis f. *nuda* Palmer & Steyermark in Ann. Mo. Bot. Gard. 25: 772 (1938).

As Fernald has shown (in *Rhodora*, 43: 563, t. 672, fig. 2. 1941), the oldest specific epithet for the *Amelanchier* generally called *A. canadensis* is "*arborea*" (*Mespilus arborea* Michx. f.). Therefore, the above new combination becomes necessary for the form with glabrous leaves of this species, described as *A. canadensis* f. *nuda* by Palmer & Steyermark, of which we have collections ranging from W. Virginia to Illinois, Kansas, and Oklahoma.

Pyrus macropoda Rehder, nom. nov.

Pyrus longipes Cosson & Durieu in Bull. Soc. Bot. France, 2: 310 (1855). — Trabut in Bull. Stat. Recherch. For. N. Afr. 1: 116, fig. 1, t. 4 (Poir. Indig. Afr.) (1916) "*Pirus*." — Non Poiteau & Turpin [1808].

Malus longipes Wenzig in Jahrb. Bot. Gart. Mus. Berlin, 2: 292 (1883).

The existence of an earlier homonym of *P. longipes* Coss. & Dur. makes necessary a new name for that species. Though the older homonym is based on a pomological form of *P. communis* and has never been taken up as a valid name by any later author, it has been validly published with a complete description and a colored plate as *P. longipes* Poiteau & Turpin in Duhamel, Traité des arbres fruitiers, nouv. éd. 4: P. no. 22; t. 57, fasc. 10 [1808], and cannot be rejected under the Rules of Botanical Nomenclature. In Index Kewensis, unfortunately, the names proposed by Poiteau & Turpin have not been correctly cited; they are credited to a later edition of Duhamel's work which was published by Poiteau under the title Pomologie française from 1838–46 in four volumes. The fact that Wenzig transferred *P. longipes* Cosson & Durieu together with *P. betulaefolia* Bge. to *Malus* shows that Wenzig had no clear concept of the characters of the genera of the Pomoideae; this is shown even more

strikingly by his referring *Chaenomeles sinensis* (Dum.-Cours.) Koehne as a variety to *P. communis* L.

Rosa multiflora f. *roseiflora* (Focke), f. nova.

Rosa multiflora v. *roseiflora* Focke ex Baenitz, Herb. Dendrol. in sched. (coll. 1902).

Rosa multiflora var. *Dawsoniana* hort. Rochester (Highland Park, Rochester, N. York).

CULTIVATED SPECIMENS: Breslau, Germany, Scheitniger Park, coll. C. Baenitz, July 9 and Aug. 8, 1902; Highland Park, Rochester, N. Y., Wm. L. G. Edson, June 14 and Oct. 11, 1922.

A typo speciei differt praecipue floribus semiplenis pallide roseis; folia 2.5–6 cm. longa, subtus sparse pubescentia; pedicelli glabri, sparse stipitato-glandulosi; ovarium glabrum vel fere glabrum; sepala extus pubescentia et stipitato-glandulosa, intus dense villosa; flores semipleni 2–3 cm. diam.; styli glabri.

Between the two specimens cited above, I can see no difference except that the flowers of the specimen from Rochester are somewhat smaller, about 2–2.5 cm. wide, while in the other specimen they are up to 3 cm. wide. The rose known as *R. multiflora* var. *carnea* Thory, introduced about 140 years ago, differs in its larger, fully double, deeper pink flowers, more densely pubescent leaves, and pubescent pedicels. The origin of the form described above is not known; the plant cultivated in Rochester is supposed to have come from the Arnold Arboretum about thirty years ago, but no such plant is now growing at that institution nor can any record of it be found.

Prunus avium f. *mamillaris* (Ser.), comb. nov.

Cerasus decumana M. D. L. [Mordant de Launay] in Bon. Jard. 1808: 103 (1808).

—Seringe in De Candolle, Prodr. 2: 536 (1825), pro syn.

Cerasus nicotianaefolia Mordant de Launay, l. c. (1808) "*nicotinaefolia*," pro syn.

—Hort. ex Seringe, l. c. (1825), pro syn.

Prunus macrophylla Poiret, Encycl. Méth. Bot. Suppl. 4: 584 (1816).

Cerasus duracina γ. *mamillaris* Seringe in De Candolle, Prodr. 2: 536 (1825).

Cerasus bigarella rostrata Poiteau & Turpin in Duhamel, Traité Arb. Fruit. nouv. éd., 2: C. no. 13; t. 377, fasc. 47 [1828].—Poiteau, Pomol. Franç. 2: C. no. 10, p. 161, t. 377 (18 [38–] 46).

Prunus nicotianaefolia Loiseleur ex Steudel, Nomencl. Bot. ed. 2, 2: 403 (1841), pro syn.

Prunus avium f. *decumana* Schneider, Ill. Handb. Laubh. 1: 616 (1906, May).

—Ascherson & Graebner, Syn. Mitteleur. Fl. 6, 2: 152 (1906, Nov.) "*P. a. b. 1. b. d.*"

As Schneider's combination under *P. avium* is not based on the oldest subspecific epithet, the combination proposed above becomes necessary. It may also here be pointed out that Poiret's name, *Prunus macrophylla*, of 1816 invalidates the later homonym *P. macrophylla* Sieb. & Zucc. of 1843, which has to receive a new name since it has no synonym to take its place.

Prunus Gondouini [*P. avium* × *Cerasus*] (Poit. & Turpin), comb. nov.

Cerasus sativa multifera Poiteau & Turpin in Duhamel, Traité Arb. Fruit. nouv. éd., 2: C. no. 28, t. 3, fasc. 1 [1807] non *Prunus sativa* Rouy & Camus (1900).

Cerasus Gondouini Poiteau & Turpin in op. cit., C. no. 29; t. 66, fasc. 11 [1808] "*Gundouini*."—Poiteau, Pomol. Franç. 2: C. no. 27; p. 127, t. 66 (18 [38–] 46).

Cerasus regalis praecox Poiteau & Turpin in op. cit. *C.* no. 26, *t.* 123, no. 2, fasc. 21 [1811].

Cerasus anglica praecox Poiteau & Turpin in op. cit., *C.* no. 27, *t.* 132, fasc. 22? [1811].

Cerasus regalis communis et *C. r. serotina* Poiteau & Turpin in op. cit., *C.* no. 24, *t.* 196, no. 25, p. 197, fasc. 33 [1826].

?*Cerasus effusa* Host, *Fl. Austr.* 2: 6 (1831).

Prunus Cerasus δ . *Aproniana* Schübler & Martens, *Fl. Würtemb.* 313 (1834).

Cerasus caprioniana κ . *regalis* Roemer, *Fam. Nat. Reg. Veg. Syn.* 3: 74 (1847).

Prunus aproniana Beck, *Fl. Nieder-Oester.* 820 (1892).

Prunus avium var. *regalis* Bailey, *Cycl. Am. Hort.* [3]: 1453 (1901).

Prunus effusa (Host) Schneider, *Ill. Handb. Laubh.* 1: 616 (1906, May).

Prunus Cerasus \times *avium* Ascherson & Graebner, *Syn. Mitteleur. Fl.* 6, 2: 153 (1906, Nov.).

Prunus avium \times *Cerasus* Hedrick, *Cherries New York*, 31, *t.* (1915).

For the group of hybrids between *Prunus avium* and *P. Cerasus* known as Duke Cherries, the name *Prunus effusa* (Host) Schneid. has been used by recent authors as a binary name based on *Cerasus effusa* Host. There are, however, several older Latin binomials used for different forms of this hybrid by Poiteau & Turpin between 1807 and 1826 which have been generally overlooked; in *Index Kewensis* they are ascribed to Poiteau, *Pomologie française* (1838-46), which is a later edition under a new title of Poiteau & Turpin's edition of *Traité des arbres fruitiers* by Duhamel. The much enlarged edition by Poiteau & Turpin was published in 71 fascicles between 1807 and 1835, but the text and plates were rearranged according to genera and published finally in six volumes, all bearing the date 1835.

As the synonymy given above shows, the oldest binomial is *Cerasus sativa*, but its specific epithet cannot be transferred to *Prunus* on account of *P. sativa* Rouy & Camus (*Fl. Franç* 6: 4. 1900), a name proposed to include as subspecies *P. domestica*, *P. ambigua*, and *P. insititia*. The next oldest name, *Cerasus Gondouini*, is based on "Belle de Choisy," a well-known form and one of the best of the Duke Cherries (cf. Hedrick, *Cherries New York*, 116. 1915), representing one of the forms of the hybrid *P. avium* \times *P. Cerasus*.

According to Poiteau & Turpin (l.c.) this hybrid was raised about 1760 by Gondouin, gardener of the royal gardens at Choisy near Paris. As Poiteau & Turpin apparently intended to name this cherry in honor of its raiser, Gondouin, it must be assumed that the spelling *C. Gundouini* is a mistake and the name should be *C. Gondouini*, as later spelled by Poiteau (l.c.).

Vitis acerifolia Rafinesque, *Med. Fl.* 2: 130, *t.* 99, fig. C (1830, pref. May); *Am. Man. Grape Vines*, 14, fig. 3 (1830).

Vitis Longii Prince, *Treat. Vine*, 184 (1830), copyright Sept. 20. — Rehder, *Man. Cult. Trees Shrubs*, 602 (1927) "? *V. rupestris* \times *arizonica*." — Bailey in *Gent. Herb.* 3: 228, fig. 103, 121 (1934).

Vitis rubra var. *Solonis* Planchon, *Vignes Amér.* 118 (1875).

Vitis Solonis Hort. Berol. ex Planchon, op. cit. 119 (1875), pro syn. — Planchon ex Rehder, *Man. Cult. Trees Shrubs*, 602 (1927), pro syn.

Vitis Nuevo Mexicana Lemmon ex Munson in *Trans. Am. Hort. Soc.* 3: 132 (1885). — Munson in *Wine & Fruit Grower*, 7: 85 (1885).

Vitis novo-mexicana Munson in Proc. Soc. Prom. Agric. Sci. 1887: 59 (1887), "*Novo Mexicana*."—Foëx, Cours Compl. Vitic. éd. 2, 876 (1888), "*Novo-Mexicana*."—Bailey in Gent. Herb. 3: 228 (1934).

In the discussion under *Vitis Longii* regarding the priority of the names *V. Longii* and *V. acerifolia*, Bailey (l.c.) makes the following statement: "As both *Longii* and *acerifolia* were published in 1830, one cannot choose between them by priority. One description is about as good as the other, but Prince had the plant in fruit. Inasmuch as the name *Longii* has been adopted for many years it may be retained."

However, there can be hardly any doubt that Rafinesque's publication has priority, for the preface is dated May, 1830; the copyright date of Prince's Treatise is September 20 of the same year. The American Manual of the Grape Vines by Rafinesque, with the exception of a few slight changes and corrections, is an exact reprint apparently from the same type (pp. 121-180) of his Medical Flora, vol. 2, and issued soon after. The references in the text of the Manual to the figures of the two plates give both the letters used in the Medical Flora and the numerals used in the Manual; also the mistake in the Medical Flora of calling fig. G "*V. multiflora*" is corrected in the Manual to *V. multiloba*.

Pieris japonica (Thunb.) D. Don f. *crispa*, f. *nova*.

A typo recedit foliis insigniter crispato-undulatis, acumine plus minusve torto, 5-7 cm. longis et 1-1.8 cm. latis.

CULTIVATED: Garden of Carl S. English, Jr., Seattle, Washington, coll. December 31, 1945 (Herb. Arnold Arb.).

The strongly undulate crispate margin of the leaves gives this form a rather striking appearance and makes the foliage look denser and more attractive.

Fraxinus sect. *Fraxinaster* DC. subsect. *Petlomelia* (Nieuwl.), comb. nov.

Fraxinus sect. *Fraxinaster* subsect. *Dipetalae* Lingelsheim in Bot. Jahrb. 40: 215 (1907).

Petlomelia Nieuwland in Am. Midland Nat. 3: 187 (1914).

The subdivision of *Fraxinus* based on *F. dipetala* Hooker & Arnott was first distinguished as a subsect. of the sect. *Fraxinaster* DC. by Lingelsheim (l.c.) and called subsect. *Dipetalae*. As the names of the other subsections are nouns, it seems logical that the names of the coördinated subdivisions should also be nouns. To have the name of coördinated divisions partly nouns and partly adjectives in plural prevents a clear presentation of the grouping of subordinated divisions in a large genus and is against general usage. The Rules of Botanical Nomenclature in this case are rather vague and I therefore proposed about six years ago a change in Art. 26 of the Rules (see Jour. Arnold Arb. 20: 269. 1939) which, I hope, will be considered at the next Botanical Congress and will lead to a modification of that article.

Lavandula officinalis f. *alba* (Gingins-Lassar.), comb. nov.

Lavandula vera β. *alba* de Gingins-Lassaraz, Hist. Nat. Lavandes, 147 (1826).

Lavandula Spica β. *alba* Sweet, Hort. Brit. 316 (1827), nom. subnud.; non Weston (1770).

Lavandula officinalis f. *albiflora* Rehder in Jour. Arnold Arb. 20: 428 (1939).

When I proposed in 1939 the combination *L. officinalis* f. *albiflora* (l.c.) for the white-flowered form of *L. officinalis* Chaix (*L. spica* L., p.p.), because *L. Spica* β . *alba* Sweet was invalidated by the older homonym *L. Spica* var. *alba* Weston, Bot. Univ. 1: 146 (1770), which is a form of *L. latifolia* Villars, I had not seen the publication of 1826 by Gingins-Lassaraz of *L. vera* β . *alba* which antedates *L. Spica* β . *alba* Sweet and presents the oldest available epithet for the white-flowered form of *L. officinalis*.

Senecio puffini H. H. Allan in litt., nom. nov.

Senecio rotundifolius Hooker f., Fl. Nov.-Zeland. 1: 149 (1853). — Cheeseman, Man. New Zealand Fl., ed. 2 (W. R. B. Oliver), 1026 (1925). — Non Stokes (1812), nec Lapeyrouse (1813).

Brachyglottis rotundifolia Forster f., Char. Gen. Pl. Austral. 92 (1776).

Cineraria rotundifolia Forster f., Fl. Ins. Austral. Prodr. 56 (1786).

The fact that *S. rotundifolius* Hook. f. is antedated by two earlier homonyms, namely *S. rotundifolius* Stokes, Bot. Mat. Med. 4: 215 (1812) = *S. aureus* L., and Lapeyrouse, Hist. Abr. Pl. Pyrén. 517 (1813) = *S. Doronicum* L., makes necessary a new specific epithet. Dr. H. H. Allan, of Wellington, New Zealand, whom I had asked if perhaps some New Zealand botanist had not already proposed a new name for this homonym, suggests that it might be named *Senecio puffini*, since this shrub is a haunt of the mutton bird (*Puffinus griseus*) and is locally known as mutton bird scrub; this proposition has been accepted here.

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A TAXONOMIC REVIEW OF EUPTELEA

A. C. SMITH

With one text-figure

INTRODUCTION

IN STUDIES of the Trochodendraceae and Tetracentraceae, Nast and Bailey (1) and the writer (3) have briefly pointed out some of the fallacies of the commonly accepted inclusion of *Euptelea* in the Trochodendraceae. The purpose of the present paper is to summarize the data pertaining to the nomenclature and taxonomy of the Eupteleaceae. In agreement with van Tieghem and several other students, we have come to the conclusion that *Euptelea* is so isolated that it must logically be placed in a unigeneric family. The genus appears to us to consist of only two species, one Japanese and the other Chinese-Indian. Full citations to the pertinent literature will be found in the bibliography of my earlier paper (3), and the same herbarium abbreviations are here utilized. In the following paper in this Journal, Nast and Bailey (2) discuss the morphology of *Euptelea* and compare it with *Trochodendron*.

TAXONOMIC TREATMENT

Eupteleaceae v. Tiegh. in Jour. de Bot. 14: 274 (Euptéléacées). 1900; Harms in E. & P. Nat. Pfl. Nachtr. 3: 111, as synonym. 1906; Hayata in Bot. Mag. Tokyo 39: (230) (Euptelaceae). 1925; Makino & Nemoto, Nippon-Shokubutsu-Sôran (Fl. Jap.) ed. 2. 306. 1931; Wettst. Handb. Syst. Bot. ed. 4. 2: 686. 1935; Nemoto, Nippon-Shokubutsu-Sôran-Hoi (Fl. Jap. Suppl.) 207. 1936.

Magnoliaceae IV. [sér.] *Eupteleae* Baill. Hist. Pl. 1: 191, p. p. (excl. *Trochodendron*). 1868-69.

Euptéléées Parment. in Bull. Sci. Bot. Fr. & Belg. 27: 175, 318, p. p. (excl. *Trochodendron*). 1896.

Trochodendraceae sensu Lee, For. Bot. China 449. 1935; Chen, Ill. Man. Chin. Trees & Shrubs 257. 1937; non Prantl.

In attempting to ascertain the proper authority for the family Eupteleaceae, one encounters the same problem as in the Tetracentraceae and various other families proposed by van Tieghem in the French spelling only. According to Art. 23 of the International Rules of Botanical Nomenclature (ed. 3. 1935), family names (with specified exceptions) must end in -aceae, and therefore van Tieghem's French names are not validly published. In the case of the Tetracentraceae (3), I proposed to accept van Tieghem's authorship, but perhaps I should be cited as the publishing author for that name. In the same way, the Eupteleaceae might best be referred to the authorship of "van Tieghem ex Hayata," since Hayata's brief note (in Japanese) in 1925 apparently first takes up the family name in the Latin form, citing van Tieghem's treatment of 1900.

Euptelea Sieb. & Zucc. Fl. Jap. 1: 133. 1841; Endl. Gen. Pl. Suppl. 2: 29. 1842; Meisn. Pl. Vasc. Gen. Pars Alt. 370. 1843; Lindl. Veg. Kingd. ed. 2. 580. 1847, ed. 3. 580. 1853; Seem. in Jour. Bot. 2: 237 (*Euptelia*). 1864; Eichl. in Flora 48: 13. 1865, in Jour. Bot. 3: 150 (*Euptelia*). 1865; Benth. & Hook. f. Gen. Pl. 1: 954. 1867; Baill. Hist. Pl. 1: 162, 191. 1868-69; Hook. f. Fl. Brit. Ind. 1: 39. 1872; Pfeiff. Nomencl. Bot. 1: 1305. 1874; Eichl. Blüthendiagr. 2: 150. 1878; Durand, Ind. Gen. Phan. 4. 1888; Prantl in E. & P. Nat. Pfl. 3(2): 23. 1888; King in Ann. Bot. Gard. Calcutta 3: 199. 1891; Harms in Ber. Deutsch. Bot. Ges. 15: 350. 1897, in E. & P. Nat. Pfl. Nachtr. 1: 159. 1897; v. Tiegh. in Jour. de Bot. 14: 270. 1900; Solereder in Ber. Deutsch. Bot. Ges. 17: 397. 1900; Rehder in Bailey, Cycl. Am. Hort. 2: 565. 1900; Hall. f. in Ber. Deutsch. Bot. Ges. 23: 89. 1905, in New Phyt. 4: 160. 1905; Finet & Gagnep. in Bull. Soc. Bot. Fr. 52: Mém. 4: 24. 1905 [repr. Contr. Fl. As. Or. 2: 24. 1907]; Harms in E. & P. Nat. Pfl. Nachtr. 3: 111. 1906; Lotsy, Vortr. Bot. Stammesg. 3: 457. 1911; Bean, Trees and Shrubs 1: 544. 1914; Rehder in Bailey, Stand. Cycl. Hort. 2: 1175. 1914; Chun, Chin. Econ. Trees 129. 1922; Rehder, Man. Cult. Trees & Shrubs 213. 1927, ed. 2. 244. 1940; Wettst. Handb. Syst. Bot. ed. 4. 2: 686. 1935; Lee, For. Bot. China 450. 1935; Chen, Ill. Man. Chin. Trees & Shrubs 257. 1937.

Trees or shrubs, the branchlets alternate, slender, with small scattered elliptic lenticels, marked at the base of each year's growth by the numerous concentric scars of bud-scales, the main branchlets often elongate and with numerous short lateral shoots; buds always axillary (terminal bud aborted, replaced by the distal axillary bud), subtended by a dilated and semi-sheathing petiole-base, ovoid or ellipsoid, in resting condition 5-10 mm. long and 3-6 mm. broad, acute at apex, both vegetative and floriferous buds composed of numerous papyraceous glossy entire castaneous or nigrescent often ciliate-margined scales; vegetative buds composed of 15-20 scales, the outermost broadly deltoid, 2-3 mm. long, 1.5-5 mm. broad, the inner one progressively larger, elliptic, up to about 10×7 mm., the young leaves strongly concave, the innermost ones conduplicate, the growing point terminal; floriferous buds composed of about 10-15 sterile scales, above which are about 6-12 floriferous bracts, these progressively more membranous, smaller, and narrower (elliptic to obovate to spatulate to linear), the innermost often about 3 mm. long, the flowers spiralled and greatly flattened in the bud, the floriferous bracts succeeded by one or two sterile bracts and several young leaves, the incipient branchlet terminated by the growing point; stipules none; leave alternate, 3-10 per season on the longer branchlets (or more on vigorous juvenile plants), often crowded and pseudowhorled on the short lateral branches and fewer (up to 7), the first-formed leaves (basal on the year's growth) often remaining small and undeveloped, sometimes subentire; petioles of mature and fully developed leaves slender, shallowly to deeply canaliculate above, often conspicuously dilated into a chartaceous sheathing bud-subtending base up to 6 mm. long and broad; blades of mature leaves smooth on both surfaces, acuminate at apex, serrate at margins, pinnate-nerved; inflorescence composed of about 6-12 flowers borne in the axils of bracts around the growing point and subsequently lateral by the vegetative development of the axis, the bracts (both sterile and floriferous) soon caducous, the flowers single, maturing before the development of leaves, often persistent in fruiting stage for more than a single season, hermaphrodite, proterandrous, anemophilous; pedicels subterete or slightly flattened, straight, slender, slightly swollen distally into a flattened torus

sometimes becoming minutely hirtellous at margin after anthesis, the flowers otherwise glabrous; perianth none; stamens borne in a single whorl on the torus near its margin, slender, the filaments filiform or slightly flattened, at length often twisted, slightly broadened distally, the anthers basifixed, linear-oblong, dehiscing by elongate lateral clefts and eventually twisting, the thecae 2, the connective produced apically into a flattened or subulate acute or subacute appendage; carpels free, borne in a single whorl just within the stamens but not definite in relation to these, conspicuously stalked, the stalks terete, gradually swollen distally, the ovary flattened, oblong or elliptic or dolabriform with the stigmatic margin ventral, or falcate with the stigmatic margin distal, obtuse at apex, the dorsal edge nearly straight or convex, the ventral edge concave and stigmatic for its entire length or merely distally, the stigmatic area covered with minute tangled sticky processes, the locule single, essentially circumalate, the ovules 1-3 (possibly very rarely 4), suborbicular, flattened, anatropous, attached to the ventral edge of the locule, horizontal or slightly pendulous, the micropyle superior; fruit a cluster of small samaras, each conspicuously stipitate, the stipes filiform at base, gradually swollen and flattened distally and expanded into the wing of the carpel; mature carpels (samaras) strongly flattened, essentially circumalate with papyraceous wings, obovate to oblong, tapering into the stipe at base, rounded at apex, the dorsal edge nearly straight or convex, the ventral edge more or less deeply indented (occasionally nearly straight) and stigmatic near the middle, the apical and basal portions of the wing conspicuous, the dorsal and apical margins thickened and vascularized, the locule usually situated slightly below the middle; seeds 1-3 (possibly very rarely 4), ellipsoid or obovoid, slightly flattened, rounded or subacute at base to an apiculate attachment, rounded at apex, the upper margin (distal in fruit) rounded, the lower margin subacute or keeled, the testa black or castaneous, papery, shining, the pericarp brittle, the endosperm oily, granular, copious, the embryo small, near basal end of seed.

KEY TO THE SPECIES

- Blades of mature and fully developed leaves broadly cuneate or rounded or truncate at base, terminating in a conspicuous acumen 1-4 cm. long, conspicuously and irregularly serrate, the largest lateral teeth up to 15 mm. long, greatly exceeding the inconspicuous smaller teeth; seeds usually solitary, sometimes 2; Japan.....1. *E. polyandra*.
- Blades of mature and fully developed leaves acute to broadly cuneate (very rarely subtruncate) at base, terminating in an acumen 0.8-2 (rarely to 3) cm. long, comparatively regularly serrate, the largest lateral teeth not exceeding 4 mm. in length, not greatly exceeding the inconspicuous smaller teeth; seeds often 2, frequently 1, occasionally 3 (possibly very rarely 4); China and northeastern India.....2. *E. pleiosperma*.

1. *Euptelea polyandra* Sieb. & Zucc. Fl. Jap. 1: 134. pl. 72. 1841; Hoffm. & Schultes in Jour. Asiat. 20: 293. 1852 [repr. Noms Indig. Pl. Jap. Chin. 37. 1853, ed. 2. 22. 1864]; Miq. in Ann. Mus. Bot. Lugd.-Bat. 3: 66 [Prol. Fl. Jap. 254]. 1867; Baill. Hist. Pl. 1: 162. 1868-69; Franch. & Sav. Enum. Pl. Jap. 1: 18. 1873; Pfeiff. Nomencl. Bot. 1: 1305. 1874; King in Ann. Bot. Gard. Calcutta 3: 199. 1891; Sargent in Garden and Forest 6: 52. 1893, For. Fl. Jap. 15. 1894; Parment. in Bull. Sci. Fr. & Belg. 27: 320. pl. 11, f. 49. 1896; Harms in Ber. Deutsch. Bot. Ges. 15: 350. 1897; Shirasawa, Ic. Ess. For. Jap. 1: 74. 1899, pl. 41, f. 17-30. 1900; v. Tiegh. in Jour. de Bot. 14: 271. 1900; Solereder in Ber. Deutsch. Bot. Ges.

17: 399. 1900; Schneider, Ill. Handb. Laubholz. 1: 270. f. 179. 1904; Vilmorin & Bois, Frut. Vilmorin. 8. 1904; Finet & Gagnep. in Bull. Soc. Bot. Fr. 52: Mém. 4: 24. 1905 [repr. Contr. Fl. As. Or. 2: 24. 1907]; Harms in E. & P. Nat. Pfl. Nachtr. 3: 111. 1906; H. Mayr, Fremdl. Wald- und Parkbäume 467. f. 188. 1906; Purpus in Mitteil. Deutsch. Dendr. Ges. 1906: 35. fig. 1906; Boodle & Fritsch, Solereder's Syst. Anat. Dicot. 809. 1908; Lotsy, Vortr. Bot. Stammesg. f. 278, 279 (as *Euptelea*). 1911; Matsum. Ind. Pl. Jap. 2(2): 97. 1912; Rehder & Wilson in Sargent, Pl. Wils. 1: 315. 1913; Silva Tarouca, Unsere Freil.-Laubgehölze 217. f. 250. 1913; Bean, Trees and Shrubs 1: 544. 1914; Rehder in Bailey, Stand. Cycl. Hort. 2: 1175. f. 1450, 1451. 1914; Hayata in Bot. Mag. Tokyo 39: (230). 1925; Mottet, Arbres et arbustes d'ornement 43. 1925; Rehder, Man. Cult. Trees & Shrubs 213. 1927, ed. 2. 244. 1940; Makino & Nemoto, Nippon-Shokubutsu-Sōran (Fl. Jap.) ed. 2. 306. 1931; Terasaki, Nippon Shokubutsu Zuhu (Ic. Fl. Jap.) pl. 30. 1933; Nemoto, Nippon-Shokubutsu-Sōran-Hoi (Fl. Jap. Suppl.) 207. 1936. *Euptelea polygama* Sieb. & Zucc. ex Rehder in Bailey, Cycl. Am. Hort. 2: 565, sphalm. 1900.

Slender tree or shrub, often freely branching and spreading, usually 5–15 m. high, the bark grayish and often rough; branchlets subterete, (1–) 1.5–3 mm. in diameter distally, purpurascens or brownish distally, grayish below, sometimes evanescently pale-strigose toward base of the yearly growth, the internodes on main branchlets 1.5–6 cm. long and on lateral shoots insignificant or occasionally up to 3 cm. long; petioles 0.6–1.2 mm. in diameter, 3–7 cm. long, sometimes sparsely strigose when young, soon glabrescent; leaf-blades papyraceous, when dried brown above and paler or greenish beneath, ovate or deltoid-ovate, 6–15 cm. long, 5–16 cm. broad, broadly cuneate or rounded or truncate at base and decurrent on the petiole, conspicuously acuminate at apex, terminating in a deltoid-lanceolate tooth 1–4 cm. long, conspicuously and irregularly serrate (teeth 2–5 per centimeter, obtusely callose, the largest ones deltoid-lanceolate, up to 15 mm. long, the smallest ones often only 0.5 mm. long), stramineous-strigose on principal nerves on both surfaces when young, at length essentially glabrescent or barbellate in nerve-axils beneath, the costa impressed or nearly plane above, prominent beneath, terminating in the apical acumen, the secondary nerves 5–10 per side, erecto-patent, straight or slightly curved, often branching distally, nearly plane or slightly impressed above, strongly raised beneath, terminating in the larger marginal teeth, the veinlets forming a copious reticulum, faintly impressed or nearly plane above, prominulous or plane beneath, the larger ones toward margin terminating in the smaller teeth; pedicels at full anthesis and in fruit 5–11 mm. long, the torus about 1–1.5 mm. in diameter; stamens 8–18, usually 10–15 mm. long at full anthesis, the filaments 4–7 mm. long at anthesis, the anthers with thecae 3–7 mm. long and an apical appendage 0.7–2 mm. long; carpels 8–18, the stalks usually 1–1.5 mm. long at maturity of stamens, the ovary at this stage 0.8–1.3 mm. long and 0.4–0.7 mm. broad, the stigmatic area 0.6–0.8 mm. long, the ovules 1 or 2; stipes of mature samaras 3–7 mm. long, the mature carpels (samaras) 6–8 mm. long and 3–4 mm. broad, the stigmatic portion 1.5–4 mm. long; seeds usually solitary, sometimes two, 2–2.5 mm. long, 0.9–1 mm. broad.

DISTRIBUTION: Japan, in central Honshu and on Shikoku and Kyushu, at elevations between about 400 and 1500 m. The type was collected by Siebold on Mt. Hakone (in the present Kanagawa Pref., Honshu). The plant is said to occur in mountain woods, usually in wet valleys or near streams, and it is apparently fairly common in

some localities. Although not of great ornamental value, the species is quite widely cultivated, apparently as a curiosity.

In the following citations, the localities are arranged in general from northeast to southwest, and the spelling used in S. Gerr's A Gazetteer of Japanese Place Names (Cambridge, Mass., 1942) is followed when possible.

JAPAN: (Without other locality): *Ex Herb. Lugd.-Bat.* (GH), *M. Kuenburg 1699a* (NY), *T. Hogg* (NY), *Collector?* (NY). HONSHU: Fukushima Pref.: Hills above Fukushima, *C. S. Sargent*, Oct. 26, 1892 (A); Kami-ogawa, near Taira, *R. K. Beattie & Y. Kurihara 10033* (US); Tochigi Pref.: Shiobara Mt., *U. Faurie 4184* (NY); Nikko, *E. H. Wilson 6704* (A), *O. Warburg 1302* (A), *K. Sakurai*, July 25, 1906, and Apr. 12, 1911 (A); Nikko to Lake Chuzenji, *C. S. Sargent*, Sept. 8, 1892 (A), *J. G. Jack*, Aug. 10, 1905 (A, GH); Gumma or Saitama Pref. [Prov. Musashi]: *G. Masamune*, June 20, 1926 (NY); Titibu, *Collector?* 20 (US); Mt. Burozan, *Collector?*, May 10, 1911 (US); Yamanashi Pref.: Between Shojiko and Kofu, *P. H. Dorsett & W. J. Morse 543* (US); Kanagawa Pref.: Mt. Hakone, *Maximowicz*, in 1862 (GH, US); Odawara, in Jugo Hakone, *Maximowicz*, in 1862 (GH); Miyanoshto, Hakone Mts., *C. S. Sargent*, Aug. 25, 1892 (A); Hakone, Ninotaira, *T. Sawada*, Apr. 9, 1927 (UC); Nagano Pref. [Prov. Shinano]: *Maximowicz*, in 1862 (GH), *Tschonoski*, in 1864 (M, NY); Tsubakura-dake, *E. H. Wilson 7478* (A); Utake-gawa, *E. H. Wilson 7762* (A); Nojiri, *J. G. Jack*, Sept. 6, 1905 (A, GH); Gifu Pref. [Prov. Mino]: *K. Shiota 1950* (A), *5100* (A), *6567* (A); Pref.?: "Jizogatake," *U. Faurie 5388* (UC), *5389* (A). SHIKOKU: Kochi Pref.: Shimokiragawa, *S. Watanabe*, May 23, 1886 (UC); Nanokawa, *K. Watanabe*, Mar. 26, 1886 (GH), May, 1888 (GH), *Collector?*, Mar. 26, 1891 (A), July 1, 1892 (US); Shimonanokawa, *S. Watanabe*, Mar. 22, 1887 (UC); Ehime Pref. [Prov. Iyo]: *Herb. K. Shiota 9468* (A). KYUSHU: No specimens seen, but cited from this island by Finet & Gagnepain (1905) and Matsumura (1912). CULTIVATED: *G. Nicholson 2315* (A) (Royal Gardens, Kew); *J. A. Purpus*, May 8, 1924 (A) and Sept., 1927 (A) (Darmstadt); *C. Schneider*, from seed coll. *C. S. Sargent* in 1892); *Collector?*, Sept. 26, 1916 (A) (Arnold Arb.); *C. E. Faxon*, May 11, 1911, Apr. 13 and 23 and May 11, 1912 (all A) (Arnold Arb.); *E. J. Palmer*, Apr. 5 and 17, 1913 (A) and Apr. 11, 1936 (M) (Arnold Arb. no. 865, from seed coll. *C. S. Sargent* in 1892); *Collector?*, Sept. 26, 1916 (A) (Arnold Arb.).

NATIVE NAMES: The most widely applied name is *Fusa-zakura*, but the following are also recorded: *Koja mansak* (by Siebold & Zuccarini), *Tani kouwa* (by Hoffmann & Schultes), *Fani kufa* (by Miquel and Franchet & Savatier), and *Taniguwa* (by Matsumura).



FIG. 1. Distribution of *Euptelea polyandra* (solid squares) and *E. pleiosperma* (solid dots). Each record represents an approximate locality from which herbarium specimens are available or have been reliably cited. From many of these localities numerous collections are known. From Goode's series of base maps, no. 226.

Euptelea polyandra is a deciduous tree, being leafless during the winter months. In its native habitat, the buds open toward the end of March and about the first of April the flowers are fully developed, the anthers shedding their pollen at this time. The carpels, although very small, probably have receptive stigmatic surfaces soon after this time. By the middle of May the stamens have fallen, the carpels are rapidly developing, and the leaves begin to appear. By the end of May or the first part of June the leaves are fully developed and the fruits are maturing. Essentially mature fruits are found on specimens collected during July, August, and September, during which period the next year's buds rapidly enlarge. By the first of November all the leaves have fallen and the buds are fully formed, while some of the fruits still persist. In this winter condition the plant rests until the following spring, the fruits being sometimes persistent for the entire winter.

2. *Euptelea pleiosperma* Hook. f. & Thoms. in Jour. Linn. Soc. Bot. 7: 243. *pl.* 2. 1864; Hook. f. Fl. Brit. Ind. 1: 39. 1872; Maxim. in Acta Hort. Petrop. 11: 39. 1889; King in Ann. Bot. Gard. Calcutta 3: 199. *pl.* 38, *A.* 1891; v. Tiegh. in Jour. de Bot. 14: 271. 1900; Solereder in Ber. Deutsch. Bot. Ges. 17: 399. 1900; Diels in Bot. Jahrb. 29: 346. 1900; Vilmorin & Bois, Frut. Vilmorin. 8. 1904; Finet & Gagnep. in Bull. Soc. Bot. Fr. 52: Mém. 4: 25. 1905 [repr. Contr. Fl. As. Or. 2: 25. 1907]; Harms in E. & P. Nat. Pfl. Nachtr. 3: 111. 1906; Boodle & Fritsch, Solereder's Syst. Anat. Dicot. 809. 1908; Rehder & Wilson in Sargent, Pl. Wils 1: 313, 315. 1913; Wilson, Nat. in W. China 1: 126, 224, 2: 11. 1913; Bean, Trees and Shrubs 1: 544. 1914; Rehder in Bailey, Stand. Cycl. Hort. 2: 1175. 1914; H. Lév. Cat. Pl. Yun-Nan 174. 1916; Chun, Chin. Econ. Trees 129. *pl.* 49. 1922; Rehder, Man. Cult. Trees & Shrubs 213. 1927, ed. 2. 245. 1940; Hu in Contr. Biol. Lab. Sci. Soc. China 5(5): 11. 1929; Lee, For. Bot. China 451. *pl.* 128. 1935; Chen, Ill. Man. Chin. Trees & Shrubs 258. 1937; Fang in Ic. Pl. Omeiens. 1(2): *pl.* 57. 1944.
- Euptelea Griffithii* Hook. f. & Thoms. ex Baill. Hist. Pl. 1: 162. 1868-69.
- Euptelea Davidiana* Baill. in Adansonia 11: 305. 1875; Franchet in Nouv. Arch. Mus. Paris II. 8: 193. 1886 [repr. Pl. David. 2: 11. 1888]; Harms in Ber. Deutsch. Bot. Ges. 15: 351. 1897; Bretsch. Hist. Eur. Bot. Disc. China 856. 1898; v. Tiegh. in Jour. de Bot. 14: 271. 1900; Solereder in Ber. Deutsch. Bot. Ges. 17: 398. 1900; Vilmorin & Bois, Frut. Vilmorin. 8. 1904; Hemsl. in Hook. Ic. Pl. 28: *pl.* 2787. 1905; Finet & Gagnep. in Bull. Soc. Bot. Fr. 52: Mém. 4: 25. 1905 [repr. Contr. Fl. As. Or. 2: 25. 1907]; Harms in E. & P. Nat. Pfl. Nachtr. 3: 111. 1906; H. Lév. Fl. Kouy-Tchéou 268. 1915.
- Euptelea pleurosperma* Groppler in Bibl. Bot. 6[Heft 31]: 21. *pl.* 1 & 2, *f.* 8, *pl.* 3, *f.* 9, sphalm. 1894.
- Euptelea Francheti* v. Tiegh.¹ in Jour. de Bot. 14: 271, 273. 1900; Vilmorin & Bois, Frut. Vilmorin. 8, 9. *fig.* 1904; Finet & Gagnep. in Bull. Soc. Bot. Fr. 52: Mém. 4: 25. 1905 [repr. Contr. Fl. As. Or. 2: 25. 1907]; Harms in E. & P. Nat. Pfl. Nachtr. 3: 111. 1906; Vilmorin, Hort. Vilmorin. 2. 1906; Rehder & Wilson in Sargent, Pl. Wils. 1: 314, 315. 1913; Wilson, Nat. in W. China 1: 52. 1913; Bean, Trees and Shrubs 1: 544. 1914; Rehder in Bailey, Stand. Cycl. Hort. 2: 1175. 1914; H. Lév. Fl. Kouy-Tchéou 268. 1915, Cat. Pl. Yun-Nan 174. 1916; Chun, Chin. Econ. Trees 129. *pl.* 48. 1922; Hers in Jour. N. China Branch Roy. Asiat. Soc. 53: 110 [repr. Liste Ess. Lign. Honan 12]. 1922; Rehder in Jour. Arnold Arb. 4: 181. 1923; Mottet, Arbres et arbustes d'ornement 42. *f.* 18. 1925; Rehder, Man. Cult. Trees & Shrubs 213. 1927, ed. 2. 245. 1940; Hu & Chun, Ic. Pl. Sin. 1: 22. *pl.* 22. 1927;

¹ Although this epithet was spelled *Francheti* by van Tieghem, many subsequent authors have changed it to *Franchetii*.

- Hu in Contr. Biol. Lab. Sci. Soc. China 5(5): 10. 1929; Lee, For. Bot. China 450. pl. 127. 1935; Chen, Ill. Man. Chin. Trees & Shrubs 258. fig. 1937.
Euptelea Delavayi v. Tiegh. in Jour. de Bot. 14: 271, 273. 1900; Harms in E. & P. Nat. Pfl. Nachtr. 3: 111. 1906.
Euptelea polyandra sensu Diels in Bot. Jahrb. 29: 346. 1900, in op. cit. 36: Beibl. 82: 45. 1905; Pampanini in Nuov. Giorn. Bot. Ital. n. s. 17: 267. 1910, in op. cit. 18: 115. 1911; non Sieb. & Zucc.
Euptelea minor Ching in Sunyatsenia 6: 15. pl. 1. 1941.

Slender tree or shrub, 2–15 m. high, the trunk up to 30 cm. (or more?) in diameter, the bark tawny brown or grayish, lenticellate; branchlets terete, striate when dried, usually 1.5–2.5 mm. in diameter distally, purpurascens distally, grayish below, glabrous, the internodes on main branchlets 1.5–3 cm. long and on lateral shoots usually inconspicuous; juvenile leaves often somewhat larger than those of mature plants, the blades up to 19×15 cm., often truncate to deeply cordate at base (unlike mature leaves); petioles 0.4–1.3 mm. in diameter, 2.5–6 cm. long, glabrous; blades of mature and fully developed leaves chartaceous or papyraceous, when dried brown above and paler or glaucous beneath, ovate or elliptic, 7–16 cm. long, 4–12.5 cm. broad, acute to broadly cuneate (very rarely subtruncate) at base and shortly decurrent on the petiole, acuminate at apex, terminating in a lanceolate or narrowly deltoid obtusely callose tooth 8–20 (rarely to 30) mm. long, regularly or somewhat irregularly serrate (teeth 2–4 per centimeter, callose-tipped, the largest ones deltoid, 1–4 mm. long, the smallest ones often only 0.5 mm. long or merely apiculate), glabrous or evanescently scattered-strigose or puberulent in groove of costa above, glabrous or sparsely barbellate in nerve-axils or subsersistently strigose on principal nerves beneath, the secondary nerves 6–11 per side, the venation similar to that of *E. polyandra*; pedicels inconspicuous at anthesis, 4–19 mm. long in fruit, the torus 0.7–1.5 mm. in diameter; stamens 6–14 in number, 8–19.5 mm. long at anthesis, the filaments 2–8 mm. long at anthesis, the anthers with thecae 4–10 mm. long and an apical appendage 0.7–2 mm. long; carpels 6–17, the stalks 0.5–1.5 mm. long at maturity of stamens, the ovary at this stage 0.5–1.5 mm. long and 0.3–0.6 mm. broad, the ovules usually 2, often 1 or 3 (possibly very rarely 4); stipes of mature samaras 4–16 mm. long, the mature carpels (samaras) 5–11 mm. long and 3.5–6 mm. broad, the stigmatic portion 1–4 mm. long; seeds often 2, frequently 1, occasionally 3 (possibly very rarely 4), obliquely superposed if more than one, 1.7–2.5 mm. long, 0.8–1.5 mm. broad, 0.7–1 mm. thick.

DISTRIBUTION: South-central China, in the Provinces of Honan, Shensi, Kansu, Hupeh, Szechuan, Kweichow, Sikang, southeastern Tibet, and Yunnan, and in north-eastern India (Assam), at altitudes between approximately 900 and 3600 m., doubtless to be expected in northern Burma and possibly in northern Indo-China. The species is apparently fairly common in parts of its range, occurring in woodlands and forests of hills and mountains, often in dense shade, sometimes in gulches on open slopes.

Localities cited below are arranged in general from northeast to southwest. Dr. J. F. Rock has kindly suggested the correct English spelling here used.

CHINA: HONAN: Tsi-yüan Hsien, Tien-tan Shan, *J. Hers* H1798 (A); Yungning, Tsi-li-ping, *J. Hers* 1340 (A); Sung Hsien, San-kuan Miao, *J. Hers* 549 (A); Sung Hsien, Shih-tzu Miao, *J. Hers* 1244 (A); Lu-shih, Kiaoho (Ch'iao-ho), *J. Hers* 972 (A); Lu-shih, Lao-chün Shan, *J. Hers* 1148 (A), 1177 (A); Lu-shih, Hiung-erh Shan, *J. Hers* 925 (A), 930 (A). SHENSI: Tsing-ling, 60 km. s. w. of Sian-fu, *J. Hers* 2997 (A); Tai-pai Shan, *W. Purdom* 1036 (A, US); Lung-tung-wan, in Tai-pai Shan,

G. Fenzl 908 (A); "Mt. Kin-tou-san" (Chin-t'ou Shan), *J. Giraldi*, July 14, 1897 (A, UC); "Thui-kio-tsuen, Miao-wang-san, Houan-tou-san, Kan-y-san, Ngo-san, Lao-y-san, and Lean-san," *Fr. Hugh (Scallan)*, 1899 (A, 11 sheets). KANSU: "Ad fl. Dschombunon, 10 Julii, '85" [not seen, but this collection, by G. N. Potanin, was cited by Maximowicz in 1889; according to Bretschneider, *Hist. Eur. Bot. Disc. China* 1013. 1898, Potanin's party was in extreme southern Kansu, south of Sikou, on July 10, 1885]. HUPEH: "Monte Si-ho, Ou-tan-schian," *C. Silvestri* 2960 (A); Hsing-shan Hsien, *E. H. Wilson* 139 (A, GH), 588 (A, GH, US); Chang-yang Hsien, *E. H. Wilson* 139a (A, GH, US); Pa-tung Hsien, *E. H. Wilson* 219 (A, US); Liang-sung-kou, *W. Y. Chun* 3768 (A), 4114 (US); Wan-tsao Shan, *W. Y. Chun* 3930 (A); near Lung-men-ho, *W. Y. Chun* 4024 (A); western Hupeh (no other data), *A. Henry* 6455 (A, GH, US), 6918 (GH, US), *E. H. Wilson* 1048 (A, NY, US), 3133 (A). SZECHUAN: South Wushan, *A. Henry* 7337 (A, GH); Kai Hsien, *W. P. Fang* 10157 (A); Nan-chuan Hs'en, *C. Y. Hwang* 161 (A); Chin-ting Shan, e. of Mou-chou, *E. H. Wilson* 3546 (A, GH, US); Kuan Hsien, *W. P. Fang* 2110 (A, NY), 2214 (A, NY), 2351 (A, NY), 2379 (A, NY); w. and s. w. of Kuan Hsien, *F. T. Wang* 29905 (A), 20666 (A); Niu-t'ou Shan, w. of Kuan Hsien, *E. H. Wilson* 3546a (A); Wei-kuan, *C. Bock & A. v. Rosthorn* 2517 (A); O-mei Hsien, *W. P. Fang* 2387 (A, NY), *S. S. Chien* 6142 (A); O-mei Shan, *T. T. Yü* 440 (A), *F. T. Wang* 23159 (A), *Y. S. Liu* 1177 (A), *C. Y. Chiao & C. S. Fan* 426 (A), *W. P. Fang* 6109 (A), 7555 (A, US), 7794 (NY), 7884 (A, NY), 12650 (A, US), 12829 (US); Ping-shan Hsien, *F. T. Wang* 22801 (A). KWEICHOW: Tu-yün, *Y. Tsiang* 5672 (A, NY, US); Kuei-yang, *Y. Tsiang* 8449 (A). SIKANG: Vicinity of K'ang-ting (Tachienlu), *A. E. Pratt* 77 (GH), *W. C. Cheng* 1650 (A, NY, US). Southeastern TIBET: Tshawarung Border, western range of Mekong on Khawakarpo, Dokar La, and Tshawarung, *J. F. Rock* 23064 (A, NY, UC); Tshawarung Border, Yung-chi Mt., *J. F. Rock* 23474 (A, UC). YÜNNAN: Mt. Kenichunpo and region of Ch'ang-p'u-t'ung, Salwin-Irrawady watershed, *J. F. Rock* 11224 (A, US); Mt. Kenichunpo, eastern and western slopes, *J. F. Rock* 22080 (A, NY, UC); mountains of Londre, Mekong-Salwin watershed, *J. F. Rock* 8892 (A, NY, UC, US); mountains above Tzu-ku and Tz'u-chung, Mekong-Salwin watershed, *J. F. Rock* 9350 (A, NY, UC, US); Salwin River near Ch'ang-p'u-t'ung, *P. Genestier* 9948 (A); Der-la, Ch'ang-p'u-t'ung, *C. W. Wang* 66803 (A); "Dzung-duei," Ch'ang-p'u-t'ung, *C. W. Wang* 66929 (A); between Chung-tien and Ch'i-tsung, *H. F. v. Handel-Mazzetti* 7786 (A); S. Chung-tien, Ch'iao-t'ou on Yangtze bank, *K. M. Feng* 3094 (A); mountains of Lü-dü (Lu-tien), n. w. of Li-chiang, w. of Yangtze, *J. F. Rock* 18509 (A, NY, US); Ta-hou Shan, near Ta-ku, n. e. Li-chiang Snow Range, *K. M. Feng* 621 (A); Mekong-Yangtze divide, *G. Forrest* 19639 (A); Yangtze-Mekong divide, near Da-mu-chong (Ta-mu-chung), *G. Forrest* 21604 (A, UC, US); Mekong-Yangtze divide, n. of Pien-tien, *G. Forrest* 25460 (US); Mekong Valley, mountains of K'ang-p'u, Yeh-chih, and An-wa, *J. F. Rock* 8934 (A, NY, UC, US), 9069 (A, UC, US); Wei-hsi Hsien, Yeh-chih, *C. W. Wang* 68216 (A), 68240 (A), 68664 (A), 71736 (A); Wei-hsi Hs'en, *C. W. Wang* 63606 (A), 63894 (A), 64050 (A), 67841 (A), 67847 (A), *H. T. Tsai* 57931 (A), 59596 (A), 63095 (A); Chung-tien Hsien, north flank of Ha-ba (Ha-pa) Snow Range, *K. M. Feng* 1198 (A); Mekong-Salwin divide, "Alulaka," *T. T. Yü* 19104 (A); Salwin Valley, Peng-ta, *T. T. Yü* 23102 (A); n. w. Li-chiang, Ta-mu-chung, *R. C. Ching* 21474 (A); Ho-ch'ing, Hsiang-shu-ho by Ma-erh Shan near Sung-kuei, *K. M. Feng* 748 (A, type coll. of *E. minor*); Chien-ch'uan-Mekong divide, *G. Forrest* 22253 (A, UC, US); between Chien-ch'uan plain and the Mekong drainage basin to La-chih-ming, *J. F. Rock* 6813 (A, UC, US), 8623 (A, NY, UC, US); San tchang kiou (San-chiang-k'ou), Ho-ch'ing, *J. M. Delavay* 3749 (NY, cotype coll. of *E. Delavayi*); "Ié-ma-tchouan," *E. E. Maire* 250 (A); "Pé-long-tsin," *E. E. Maire* 495 (A); "Liang-shan La'mi," *H. T. Tsai* 51245 (A); Meng-tzu, *A. Henry* 10746 (A, M, NY, US); Yünnan, without further data, *G. Forrest* 13914 (A), 16206 (A), *T. T. Yü* 11287 (A), *H. T. Tsai* 57191 (A), 57356 (A), 57590 (A), 57602A (A), 57697 (A), 63132 (A). INDIA: ASSAM: *W. Griffith* 5022 (GH, source of the name *E. Griffithii*; probably also a duplicate of the unnumbered Griffith collection from Mt. Thumathaya, Mishmi Hills, which is the TYPE of *E. pleiosperma*). CULTIVATED: *A. Rehder*, June, 1901 (A) (Hort. Vilmorin); *Arnold*

Arb. (A, several collections made on grounds between 1912 and 1933, from plants originating from collections of Purdom, Hers, and Wilson).

NATIVE NAMES: *Shui-tao* and *Shui-tao-tzu* are apparently the only regularly used local names, being recorded by several collectors. Numerous local names from Honan and Shensi, recorded by Hers and possibly not reliable, are: *Cheng-sin*, *Chen-sin-mu*, *Ho-ma-tzu*, *Lin-chuen-mu*, *Mo-yeh*, *Ta-yeh-tuan*, and *Yeh-chen-tzu*. Diels records the use of the name *Shan ye hao* in Szechuan.

The annual cycle of *E. pleiosperma* is essentially similar to that of *E. polyandra* as described above. Spring development is very rapid, and by the end of April the leaves are often nearly mature. The carpels mature quickly during May, and by July the fruits appear fully developed. Some specimens collected in November have both fruits and leaves persisting, but as a rule both are lost at this time, although the pedicels often persist over the winter. According to collectors' color notes, the anthers of *E. pleiosperma* are crimson or brownish, while the young samaras are white to green, becoming reddish or purplish at maturity.

The first mention of the occurrence of *Euptelea* outside of Japan was made by Hooker and Thomson in 1864, in a paper discussing the relationships of the genus. Although their discussion shows definitely that Hooker and Thomson regarded *Euptelea* as a distinct genus worthy of family rank, they refrained from proposing a new family and placed the genus provisionally in Magnoliaceae Sect. Winteraeae. *Euptelea pleiosperma* is based upon a plant collected by Griffith in the Mishmi Hills of Assam, apparently collected late in the year, as the fruit is fully mature, the buds are well-formed, and "the specimens have a very few old leaves only." The Griffith specimen cited above (no. 5022), which was distributed from Kew under the name *Euptelea Griffithii*, is in similar condition and is almost certainly a duplicate of the type. The epithet *Griffithii* was unfortunately recorded by Baillon and must therefore be cited in synonymy.

Euptelea Davidiana Baill., described in 1875, was based on a flowering specimen collected in western Szechuan by David; Baillon's only discussion of its position states: "Species, a congener. chinensi et indica valde diversa, . . ." Baillon made the usual error of taking the flowers to be imperfect ("Carpella in flore masculo sterilia. . ."). Oliver (in Hook. Ic. Pl. 24: pl. 2361. 1895) and Harms (in Ber. Deutsch. Bot. Ges. 15: 351. 1897, in E. & P. Nat. Pfl. Nachtr. 1: 159. 1897) suggested that *Euptelea Davidiana* might be conspecific with *Eucommia ulmoides* Oliv. (1890), but they refrained from making the implied combination. There is no reason for such an assumption, as both Solereder (in Ber. Deutsch. Bot. Ges. 17: 398. 1900) and van Tieghem (in Jour. de Bot. 14: 271. 1900) have pointed out. Solereder, discussing the species at some length, refers it to the synonymy of *E. pleiosperma*; van Tieghem retains it as distinct on the grounds that the two types—one in fruit and the other in flower—could not be properly compared. Most subsequent authors have reduced *E. Davidiana* to *E. pleiosperma* without question, and this is doubtless its correct position.

Van Tieghem (op. cit. 271–273) recognized five species in *Euptelea* — the already described *E. polyandra*, *E. pleiosperma*, and *E. Davidiana*, and two new ones, *E. Francheti* and *E. Delavayi*. *Euptelea Francheti* was based on two collections of Farges from eastern Szechuan (“près de Tchen-Kéou”); *E. Delavayi* is typified by three collections made in Yünnan by Delavay. The characters utilized by van Tieghem to distinguish his two novelties from *E. pleiosperma* are not very convincing, and indeed *E. Delavayi* has been consistently referred to synonymy. *Euptelea Francheti*, however, has been maintained by most students for the eastern portion of the Chinese population of the genus.

In attempting to maintain more than one species of *Euptelea* in China, writers since 1900 have resorted to various characters of presumed diagnostic value. Finet and Gagnepain (in Bull. Soc. Bot. Fr. 52: Mém. 4: 24–25. 1905) utilized the shape of the fruit and the apex of the leaf to distinguish *E. Francheti* and *E. pleiosperma*. Other students have sought differences in the length of filaments and anthers and the number of seeds. Rehder and Wilson (in Sargent, Pl. Wils. 1: 313–315. 1913), on the basis of considerably more material than was available to previous workers, concluded that “The appearance of the under surface of the leaves, however, affords a constant character by which the species, and especially the two Chinese species, may easily be recognized.” This difference is summarized as follows:

E. Francheti: Under surface of leaves green, non-papillose, the epidermis being perfectly smooth.

E. pleiosperma: Under surface of leaves glaucescent, papillose.

The abundant material cited above has been carefully examined under high magnification with this difference in mind. The lower leaf-surface of many specimens is indeed “papillose,” the papillae being minute protrusions of epidermal cells. Furthermore, many specimens have the leaves obviously glaucous beneath, while others have them greenish or pale brown when dried. It is possible that the papillose texture is, on the whole, more marked toward the west and that it often accompanies a certain characteristic paleness. On the other hand, both glaucous and papillose surfaces are frequently found among the eastern specimens. These characters, therefore, do not seem to be associated with geographical distribution (as supposed by Rehder and Wilson), and one may doubt that they have any important genetic basis.

The most recent binomial referred to *Euptelea*, *E. minor* Ching, is based upon *Feng 748* from Yünnan (isotype cited above). This specimen bears young developing carpels and half-developed leaves and is in all respects typical of *E. pleiosperma*.

The most exhaustive examination of the available specimens fails to disclose any constant characters by which the Chinese population of *Euptelea* can be divided into groups for nomenclatural purposes. In spite of a high degree of variation in number and dimensions of parts, the species is fundamentally very constant. In fact, examination of my

key to the species, above, indicates that the only usable differences between the Japanese and Chinese populations are themselves somewhat unsatisfactory. However, characters pertaining to the shape and dentation of the leaves, together with the predominance of 1-seeded samaras in Japan and 2-seeded samaras in China, make the recognition of two species in the genus desirable.

POSITION OF THE FAMILY

In the discussion by Nast and Bailey (2) which follows this paper, the numerous and striking differences in morphology between *Euptelea* on the one hand and *Trochodendron* and *Tetracentron* on the other are taken up. In view of the nature and number of these differences, it must be assumed that tradition alone has been responsible for the long-continued placing of *Euptelea* in the Trochodendraceae. Even the character most often cited as a reason to combine *Euptelea* and *Trochodendron* in the same family — the absence of a perianth — is seen to be unreliable, since the toral bracteoles of *Trochodendron* may possibly be interpreted as perianth-remnants. There appears to be no other existing genus with which *Euptelea* can be satisfactorily compared, and the family Eupteleaceae may be said to be without close allies. That it is a member of the Ranales, in the broad sense, appears to be reasonably certain, but it is anticipated that an eventual revision of the entire order will result in the proposal of a separate suborder to include only the family Eupteleaceae.

LITERATURE CITED

1. NAST, CHARLOTTE G., and I. W. BAILEY. Morphology and relationships of *Trochodendron* and *Tetracentron*, II. Inflorescence, flowers, and fruit. Jour. Arnold Arb. 26: 267–276. 1945.
2. ——— and ———. Morphology of *Euptelea* and comparison with *Trochodendron*. Jour. Arnold Arb. 27: 186–192. 1946.
3. SMITH, A. C. A taxonomic review of *Trochodendron* and *Tetracentron*. Jour. Arnold Arb. 26: 123–142. 1945.

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MORPHOLOGY OF EUPTELEA AND COMPARISON WITH
TROCHODENDRON

CHARLOTTE G. NAST AND I. W. BAILEY

With four plates

INTRODUCTION

IN PRECEDING papers (3, 4), we have discussed various fundamentally significant similarities between *Tetracentron* and *Trochodendron* which are indicative of relatively close genetic relationship. We shall now concern ourselves with a discussion of salient morphological features of *Euptelea* in an endeavor to determine whether this genus actually belongs in the family Trochodendraceae.

WOOD

The most significant difference between the wood of *Euptelea* and that of *Trochodendron* is the presence of well developed vessels in *Euptelea* and the absence of such structures in *Trochodendron*. The thin-walled, more or less angular vessels (*Fig. 1*) of *Euptelea* are numerous and diffusely distributed, but exhibit conspicuous size differences as between the early and late wood. The vessel members are relatively long with extensively overlapping ends and have scalariform perforation plates with numerous bars. The intervacular bordered pitting is transitional between scalariform and opposite-multiseriate, the former type tending to predominate in the smaller vessels, e.g. of young stems, the latter type in the larger vessels of older stems. The pitting between vessels and parenchyma is scalariform with transitions to opposite. The non-perforate tracheary elements are thick-walled fiber tracheids, having pits with reduced but conspicuous borders.

The wood parenchyma, which fluctuates from scanty to fairly abundant (*Fig. 1*), is distributed diffusely or in short tangentially oriented aggregates. As in *Trochodendron*, the wood parenchyma strands have a high ratio of obliquely oriented partitions. The rays in the outer parts of large stems are of the so-called heterogeneous type II, the multiseriate rays having fusiform outlines with short uniseriate wings as seen in tangential sections (*Fig. 2*) and the low uniseriate rays being composed of upright cells. In young stems, e.g. twigs from herbarium specimens, the rays are of the heterogeneous type I and the first-formed multiseriate rays extend outward from the interfascicular parts of the eustele. The most conspicuous difference between the rays of *Euptelea* and those of *Trochodendron* and *Tetracentron* is the precocious and extensive sclerification of the multiseriate rays in the phloem of *Euptelea*.

NODAL ANATOMY AND LEAF

The nodal anatomy of *Euptelea* is distinctive of the genus and is of a type that has not been encountered by us in any other large woody dicotyledon. At the base of normally enlarged leaves of mature plants, there are 5–11 foliar vascular strands (Figs. 3 and 6), preliminary investigations indicating that such strands tend to be more numerous in *E. pleiosperma* than in *E. polyandra*. At certain levels of the attachment of the leaf (Figs. 7 and 8), these strands *commingle* with those of the axillary bud forming an arc of vascular strands that confronts a single broad parenchymatous region of the eustele. Thus, the node is of a much modified unilacunar type in which the vascular strands of the axillary bud extend¹ downward *between* the foliar strands of the leaf. In passing outward through the petiole, the foliar vascular strands first aggregate into an arc (Fig. 4) and subsequently into a vascular cylinder (Fig. 5) which extends into the midrib of the lamina.

The lamina of the leaf contains no branching idioblasts, either sclerotic or secretory, such as occur so characteristically in *Trochodendron* and *Tetracentron*. The epidermal cells surrounding the stomata are not of special form and orientation, and the stomatal apparatus as a whole bears no resemblance to the bizarre and highly modified stomatal structures of *Trochodendron*.

REPRODUCTIVE PARTS

The development of both the vegetative and the flower-bearing shoots of *Euptelea* is sympodial, no functional terminal buds being formed at the end of the growing season. This is in contrast to *Tetracentron* and *Trochodendron*, where extension of purely vegetative shoots is monopodial and that of flower-bearing ones is sympodial. The flower buds of *Euptelea* have numerous sterile scales which are succeeded on incipient shoots by 6–12 floriferous bracts and these subsequently by a varying number of leaves. The flowers are born singly in the axils of the floriferous bracts. The inflorescences of *Trochodendron* and *Tetracentron* are terminal, whereas the flower-bearing part of a fertile shoot of *Euptelea* is succeeded by a more or less extensive leaf-bearing prolongation. The fertile part of the shoot thus resembles the so-called intercalary inflorescences of *Drimys*, but in the latter genus monopodial extension of the axis does not terminate at the end of a growing season.

The flowers of *Euptelea* have long pedicels (Fig. 9), the apex of which flares into a disc-like receptacle devoid of perianth. A variable number of stamens are born in a whorl on the outer rim of this receptacle. At least in the case of specimens of *E. polyandra* growing at the Arnold Arboretum, the stamens are protandrous and caducous, stamen scars only (*st. sc.*, Fig. 9) being present at a stage when the enlarging carpels become receptive. The conspicuously stipitate carpels are likewise borne in a whorl. The vascular system of the flower is remarkably simple. A

¹ The wording used in this paragraph is purely descriptive and bears no implications regarding developmental sequences.

eustele of many small strands extends throughout the pedicel. This eustele resolves at the base of the receptacle into a whorl of staminal traces, the remaining vascular tissue becoming carpellary strands, one to each carpel. There is no residual vascular tissue in the torus.

The microsporophyll of *Euptelea* is differentiated into a slender filament, an extensive connective, and an acuminate vascularized apex which projects above the thecae (*Fig. 13*). The four elongated and conspicuously protruding sporangia are laterally oriented in pairs. A single vascular strand extends throughout the microsporophyll, terminating at its apex. The endothecia may completely jacket the sporangia (*Figs. 14 and 15*) as in the Winteraceae. Occasionally they may extend across the adaxial side of the connective (*Fig. 14*).

The pollen grains are of two types, a tricolpate form which is characteristic of most specimens of *E. pleiosperma* and a polycolpate (mostly hexacolpate) one which predominates in a majority of the examined specimens of *E. polyandra*. However, one collection of *E. polyandra* (Sawada, April 9, 1927 [UC 382263]) has tricolpate pollen, and two collections of *E. pleiosperma* (Forrest 16206 and Wilson 1048) have polycolpate grains. The grooves of the hexacolpate pollen are arranged in several patterns, two of the commonest of which are illustrated in *Figs. 16 and 17*. The reticulation of the exine (*Fig. 18*) is extremely fine, giving to the exine at times the appearance of being minutely pitted. The floor of the grooves is covered with small slightly embossed papillae which may be aggregated into chains. The contrast between the papillate and reticulate areas of the exine is slightly intensified in the drawing.

The megasporophylls (*Fig. 9*) have much elongated stipes and superficially resemble those of *Drimys stipitata* Vickery, except that the stigmatic surfaces of the conduplicate lamina do not protrude to form conspicuous double stigmatic crests as in the Winteraceae and Schisandraceae. The carpels, both during their earlier stages of development (*Fig. 10*) and at anthesis (*Figs. 11 and 12*), fluctuate markedly in external form. They are particularly significant from both developmental and phylogenetic points of view in illustrating successive morphological modifications in the closure of primitive conduplicate ranalian megasporophylls and in the restriction of their stigmatic surfaces. The stipe contains a single vascular strand which divides in the base of the conduplicate lamina (*Fig. 12*) into a dorsal vein and a strand which bifurcates just below the stigmatic level of the carpel into two ventral veins. The dorsal vein, which parallels the contour of the dorsal edge of the carpel, forms a conspicuous lateral branch which traverses the carpel above its locule and unites with the ventral veins (*Figs. 12 and 19*).

In addition to an over-all enlargement of the carpel to form the fruit, there is a marked elongation in the region below the stigmatic surfaces (compare *Figs. 12 and 19*). The fruit is papyraceous and contains 1-3 (rarely 4) small anatropous seeds (*Fig. 20*). The outer seed coat consists of an external layer of large thin-walled cells, which give a reticu-

late appearance to the seed, and an inner sclerenchymatous layer. The inner seed coat is composed of small thin-walled cells. There is an abundant endosperm in which is embedded a small embryo with incipient cotyledons. A foot-like structure composed of very small parenchymatous cells is located at the chalazal end of the endosperm and presumably is a structure derived from the antipodal cells of the megagametophyte.

DISCUSSION

Tetracentron and *Trochodendron* exhibit numerous morphological similarities, the *totality* of which provides convincing evidence of relatively close genetic relationship. Particularly significant in this connection are similar trends of morphological specialization of the vesselless xylem, the stomata, carpels, stamens, ovules, and seeds. None of these salient developmental and structural peculiarities occur in *Euptelea*.

The evolutionary gap between the vesselless xylem of *Trochodendron* and *Tetracentron* and the vessel-containing wood of *Euptelea* is so wide that it alone serves as a serious, if not insuperable, obstacle to the inclusion of *Euptelea* in the Trochodendraceae, and completely neutralizes any structural similarities between the rays and the wood parenchyma of the three genera. So-called heterogeneous type II rays occur in diverse families of dicotyledons which have attained comparable levels of parallel phylogenetic development and of themselves are not indicative necessarily of close genetic relationships. Furthermore, the precocious and extensive sclerification of multiseriate rays in the phloem of *Euptelea* — as in Winteraceae and certain other families of dicotyledons — is a type of structural specialization that does not occur in *Trochodendron* and *Tetracentron*. Nor is the occurrence of a high ratio of diagonal partitions in wood parenchyma strands, by itself, indicative necessarily of close genetic relationship, since such partitions occur for example in certain representatives of such remotely related families as the Magnoliaceae (*sensu stricto*) and the Saxifragaceae.

The extension of vegetative shoots of *Euptelea* is sympodial, whereas that of *Trochodendron* and *Tetracentron* is monopodial. The normally enlarged leaves of adult *Eupteleae* have unilacunar nodal attachments that are characteristically modified by peculiarities in the vascularization of the axillary buds. On the contrary, comparable leaves of *Tetracentron* and *Trochodendron* have trilacunar and multilacunar nodes and the vascularization of the axillary buds is of a commonly occurring and fundamentally different dicotyledonous type. The vascularization patterns of the petiole and lamina differ in the three genera, but such patterns should not be unduly emphasized in discussions of relationships, since they frequently fluctuate widely not only within the limits of specific genera and families but also in different leaves of a single plant. The stomata of *Euptelea* do not exhibit the peculiar structural specializations that occur so characteristically in *Trochodendron* and *Tetracentron*. Nor does *Euptelea* form branching idioblasts of either sclerotic or secretory types.

The inflorescences of *Trochodendron* and *Tetracentron* are truly terminal,

whereas the fertile part of the axis in *Euptelea* subtends a leaf-bearing terminus. The flowers of the two categories of genera differ markedly both in the external form and the internal structure of their constituent parts. The conspicuously stipitate, style-less carpels of *Euptelea* illustrate a distinct trend of specialization and closure of the primitive, open, conduplicate, ranalian megasporophyll which is entirely unlike that which has given rise to the style-bearing carpels and basally incipient syncarpy of *Trochodendron* and *Tetracentron*. Furthermore, the ovules of *Euptelea* do not have the vascularized subchalazal projection which is such a distinctive feature of the ovules of the latter genera. The fundamental differences in the carpels are reflected in the fruits, those of *Euptelea* being clusters of samaras and those of *Tetracentron* and *Trochodendron* being folliceta with ventral loculicidal dehiscence. The slender much elongated seeds of the latter genera have characteristic extensions of the vascularized subchalazal projections and resemble those of *Euptelea* only in characters, e.g. copious endosperm, small embryo, etc., which are indicative of general rather than of specific ranalian affinities.

The stamens of *Euptelea* differ from those of *Trochodendron* and *Tetracentron* not only in their external form but also in the development of their endothecia. They are attached to the rim of a flattened torus, whereas in *Trochodendron* the free parts of the filaments arise from the dorsal surfaces of the carpels. The pollen of *Euptelea* fluctuates from tricolpate to polycolpate, tricolpate grains tending to be dominant in *E. pleiosperma* and hexacolpate ones in *E. polyandra*. In *Tetracentron* and *Trochodendron*, the pollen grains are prevailing tricolpate, are smaller than those of *Euptelea*, have narrower grooves, a more coarsely reticulate exine, and in *Trochodendron* a crestlike median thickening of the floor of the grooves. Tricolpate pollen having reticulate exines and papillate thickenings on the floor of the grooves occurs in various dicotyledons. Furthermore, transitions from tricolpate to polycolpate grains occur in Ranunculaceae, Berberidaceae, and in other families. Thus, the morphology of the pollen, by itself, is not indicative necessarily of close relationship between *Euptelea* and *Trochodendron* or *Tetracentron*.

The chromosomes of the two categories of genera differ in size, form, and number, the basic number in *Euptelea*, as in *Illicium* and the Schisandraceae, being 14, whereas in *Trochodendron* and *Tetracentron*, as in *Cercidiphyllum* and certain Magnoliaceae and Winteraceae, it is 19 (see Whitaker, 7).

The morphological differences between *Euptelea* and *Trochodendron* are numerous and indicative of divergent trends of phylogenetic specialization in all organs of these plants. Significant structural similarities are few and are suggestive of common ranalian ancestry rather than of actual close genetic relationship between the two genera. Why then should the genera have been placed in the same family? The decision to do so appears to have been based largely, if not entirely, upon the absence of a perianth, resulting in the inclusion of such strange bedfellows as *Eucommia*, *Cercidi-*

phyllum, *Euptelea*, and *Trochodendron* in the Trochodendraceae. *Eucomia* and *Cercidiphyllum* have subsequently been placed in separate unigeneric families, and we agree with van Tieghem (6) and Smith (5) that *Euptelea* should similarly be placed in an independent family, the Eupteleaceae.

As in the case of the Winteraceae (see Bailey and Nast, 1), the family Eupteleaceae exhibits evidences of general ranalian affinities, but does not appear to be closely related to any specific surviving family of the ranalian complex. It obviously cannot be placed in close proximity to those woody ranalian families (see Bailey and Nast, 2), which are characterized by having monocolpate and derived types of pollen and numerous aromatic secretory cells. Although it appears to belong in the category of ranalian families having tricolpate and derived types of pollen and no aromatic secretory cells, it cannot be placed in close proximity to any of them, e.g. Ranunculaceae, Berberidaceae, Lardizabalaceae, Menispermaceae, or Trochodendraceae. It remains to be determined whether the family Cercidiphyllaceae is of ranalian rather than of rosalian affinities, but in any case it is not closely related to the Eupteleaceae. Nor does the latter family form a natural compact grouping with the Schisandraceae.

LITERATURE CITED

1. BAILEY, I. W., and CHARLOTTE G. NAST. The comparative morphology of the Winteraceae, I. Pollen and stamens. Jour. Arnold Arb. 24: 340-346. 1943.
2. ——— and ———. VII. Summary and conclusions. Jour. Arnold Arb. 26: 37-47. 1945.
3. ——— and ———. Morphology and relationships of Trochodendron and Tetracentron, I. Stem, root, and leaf. Jour. Arnold Arb. 26: 143-154. 1945.
4. NAST, CHARLOTTE G., and I. W. BAILEY. Morphology and relationships of Trochodendron and Tetracentron, II. Inflorescence, flower, and fruit. Jour. Arnold Arb. 26: 267-276. 1945.
5. SMITH, A. C. A taxonomic review of Euptelea. Jour. Arnold Arb. 27: 175-185. 1946.
6. TIEGHEM, P. VAN. Sur les dicotylédones du groupe des Homoxylées. Jour. de Bot. 14: 259-297, 330-361. 1900.
7. WHITAKER, T. W. Chromosome number and relationship in the Magnoliales. Jour. Arnold Arb. 14: 376-385. 1933.

EXPLANATION OF PLATES

PLATE I

FIG. 1. *Euptelea polyandra*. Transverse section of the wood, $\times 120$. FIG. 2. The same. Tangential longitudinal section of the wood, $\times 120$.

PLATE II

FIG. 3. *Euptelea polyandra*. Transverse section of lower part of petiole, $\times 20$. FIG. 4. The same. Transverse section of middle part of petiole, $\times 20$. FIG. 5. The same. Transverse section of upper part of petiole, $\times 20$.

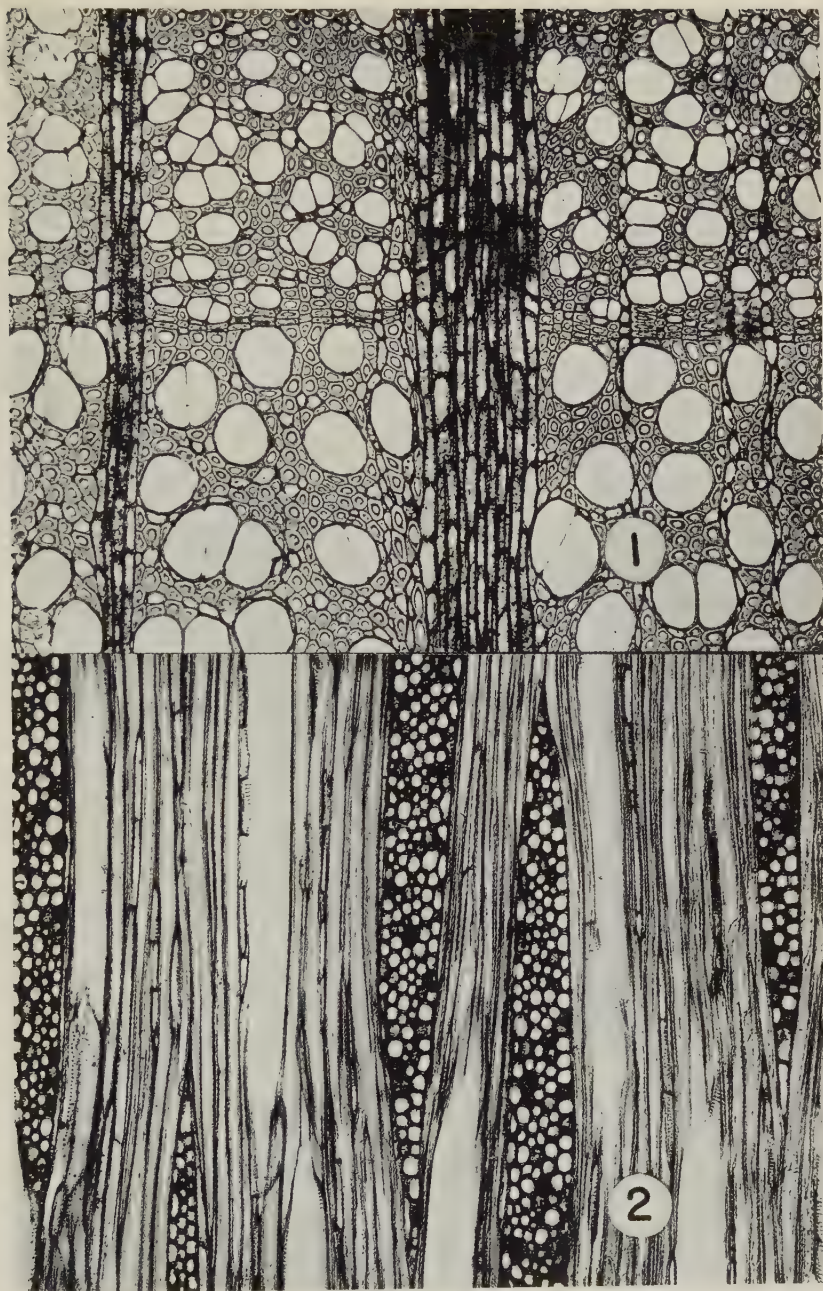
PLATE III

FIGS. 6-8. *Euptelea polyandra*. Transverse sections of node, showing vascular strands of leaf and bud, approx. $\times 16$. FIG. 9. *E. pleiosperma*, Forrest 25460. Flower, showing mature carpels after stamens have fallen. Stamen scar, *st. sc.*, approx. $\times 6\frac{1}{2}$. FIG. 10. The same, Hers 930. Young carpel, approx. $\times 77$. FIG. 11. *E. polyandra*, Wilson 6704. Mature carpel, approx. $\times 13$. FIG. 12. *E. pleiosperma*, Forrest 25460. Mature carpel. Dorsal bundle, *d. b.*; dorsal branch, *d. br.*, approx. $\times 10$.

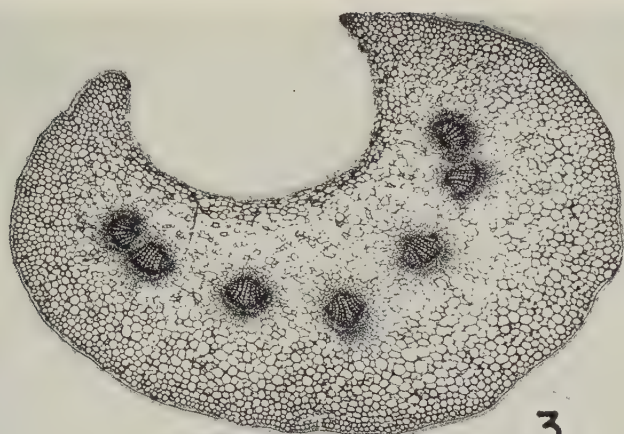
PLATE IV

FIG. 13. *E. pleiosperma*, A.A. 14796 (cult.). Stamen showing extension of sporophyll above the thecae, $\times 15$. FIG. 14. *E. polyandra*, A.A. 865 (cult.). Transverse section of stamen, $\times 825$. FIG. 15. *E. pleiosperma*, A.A. 14796 (cult.). Transverse section of stamen, $\times 825$. FIGS. 16, 17. *E. polyandra*. Hexacolpate pollen grains showing position of grooves. FIG. 18. *E. pleiosperma*, Feng 621. Tricolpate pollen grain, $\times 7500$. FIG. 19. *E. pleiosperma*, Tsai 63095. Fruit, approx. $\times 4\frac{1}{2}$. FIG. 20. The same. Seed, approx. $\times 12\frac{1}{2}$.

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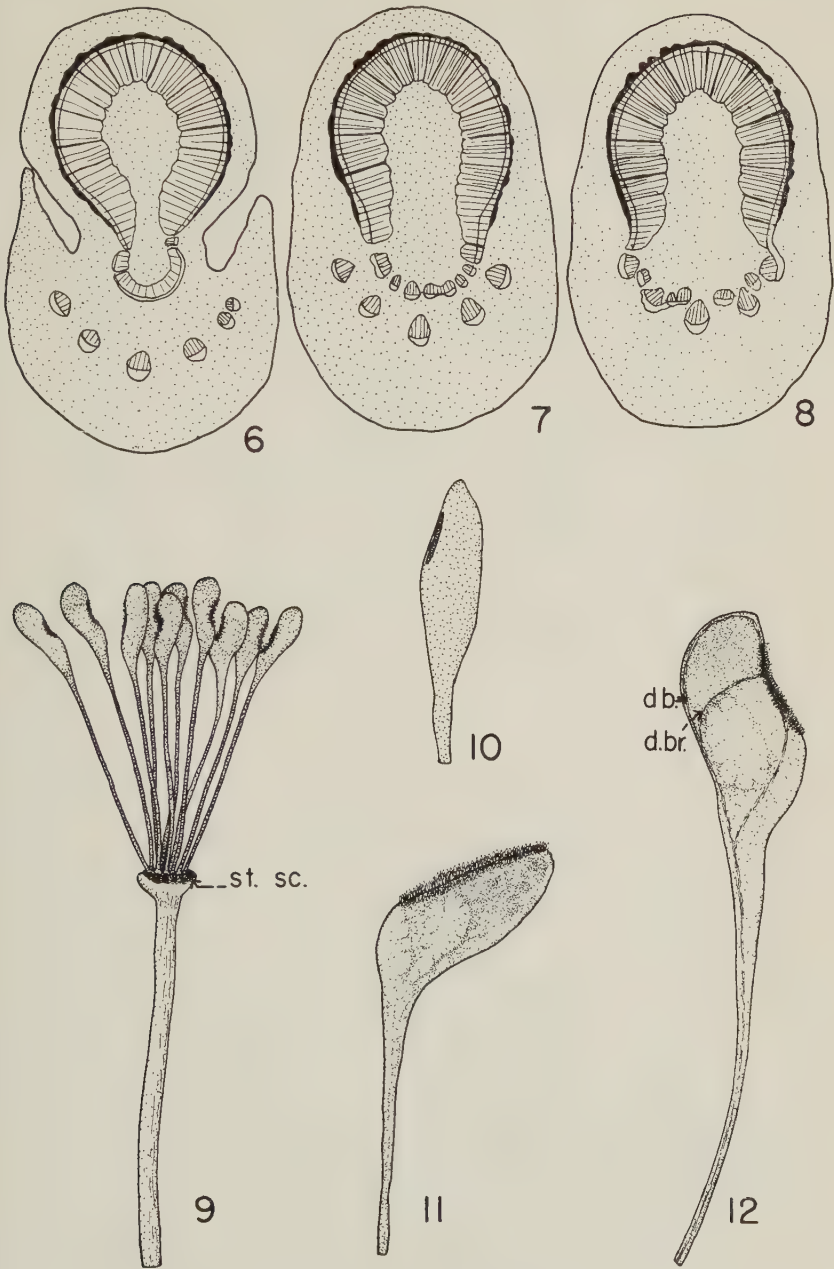


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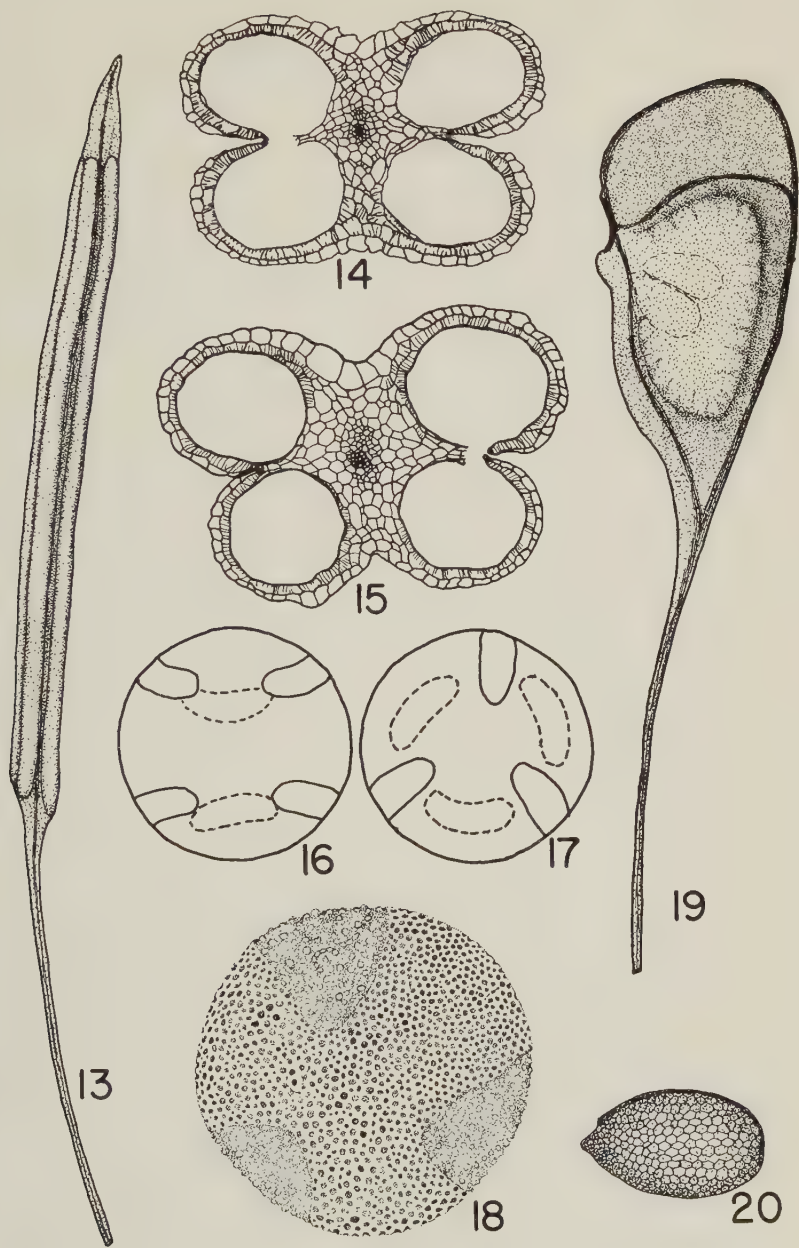


5

MORPHOLOGY OF EUPTELEA



MORPHOLOGY OF EUPTELEA



MORPHOLOGY OF EUPTELEA

PLANTAE PAPUANAE ARCHBOLDIANAE, XVII*

E. D. MERRILL AND L. M. PERRY

THIS ARTICLE contains the remaining genera of the Psychotrieae not considered in previous papers. It includes *Psychotria*, *Calycosia*, *Cephaelis*, *Lasianthus*, *Saprosma*, and *Amaracarpus*, as well as we can determine them without more material for comparison. Of all the Rubiaceae dealt with in this series of papers, these genera are by far the most difficult to delimit. In some instances the variation of single characters is so constant that it is most troublesome to decide whether this is of generic significance or not. For example, we have placed in *Saprosma* only those plants characterized by stiff or bristle-like elongated glands(?) on the stipules or bracts of the inflorescence; yet, the specimen which we have described under *Calycosia* has a few fairly long and widely scattered callose teeth (or glands?) on the margins of the exceedingly large stipules. These teeth or glands are not on the margins of the bracts, but within at the base is a row of rather large colleters. However, the habit of the plant is much more like that of *Calycosia*, and on account of its agreement in other characters we have placed it there at least for the present. After hastily scanning the definitions of *Psychotria* in the literature from various parts of the world, we have been somewhat puzzled to know what to include or to exclude as border species, hence we began our study with those plants which would be recognized universally as *Psychotria* (including *Grumilea*), and worked toward the periphery of the genus. There are bound to be borderline species which some might place in this genus and others in closely related ones. In such instances we have endeavored to adhere to the generic concepts used by Valeton in this area, believing that he had available much more material for comparison than we, although we have not located any publication in which he defined the genera. One species from the Solomon Islands we have placed in *Cephaelis*, although we are not unaware of a tendency to separate the Old and the New World genera of this type. The decision in such matters should rest with those workers who consider the group in its entirety and not on the basis of material from a small geographic area. As for *Amaracarpus* and the genus *Dolianthus* C. H. Wright, we have given a fairly detailed discussion of our position at the beginning of our treatment of the former genus.

RUBIACEAE (concluded)

Psychotria Linnaeus (including *Grumilea* Gaertner)

In the Papuanian region are three species of *Psychotria* with pre-empted specific names: *P. ixorioides* Val., non Bartl. ex DC.; *P. polyneura* Val.,

* Botanical results of the Richard Archbold Expeditions. See Jour. Arnold Arb. 26: 229-266. 1945.

non DC.; and *P. puberula* K. Schum. non Wright. These do not appear to be represented in our material.

Psychotria carstensensis Wernham, Trans. Linn. Soc. II. Bot. 9: 75. 1916, vel aff.

BRITISH NEW GUINEA: Mount Tafa, *Brass* 4857, Aug., 1933, alt. 2400 m., very common, conspicuous in tree tops (large liane; dark glabrous leaves, shining above, midrib white; peduncle, pedicels and corolla white; calyx and ovary green; fruit yellow-green, about 6×5 mm.).

It seems best at present to place this collection here until it can be compared with the type. It does not wholly agree with the original description, in which the leaves are described as obovate but later in the comment designated as ovate. In the *Brass* collection the leaves are slightly smaller and the petioles a little shorter; on the two specimens at hand only one stipule and remnants of two others are present; the stipule is lanceolate, hairy inside, but broken at the apex, it is only 1.3 cm. long and 4 mm. wide; the inflorescence is apparently sessile; the corolla-tube is 4.5 mm. long and densely short-villous within the upper half; the fruit is slightly sulcate, and the albumen strongly ruminant.

Psychotria Leonardii nom. nov.

Psychotria Brassii S. Moore, Jour. Bot. 65: 268. 1927, non Hiern (1877).

In naming this species, Moore apparently overlooked the fact that another species had already received the specific epithet *Brassii*; in order to preserve the original intention of the author, we have used a specific epithet based on the collector's given name.

Psychotria olivacea Val. Bot. Jahrb. 61: 77. 1927.

BRITISH NEW GUINEA: Palmer River, 2 miles below junction Black River, *Brass* 7341, July, 1936, alt. 100 m., large liana of forest canopy (leaf-nerves prominent above, less so below; flowers yellow outside, red within). SOLOMON ISLANDS: Bougainville: Siwai, *Waterhouse* 64, Jan., 1933 (vine used in Taro cultivation); Torge-galla, *Kajewski* 1783 bis, 2194, May and September, 1930, alt. 150 m. and 40 m., vine climbing up rain-forest trees (petals light green-brown; fruit white when ripe, 7-8 mm. long, 8-9 mm. diameter); Pour-gor-kucki, *Kajewski* 1884, June, 1930, alt. 150 m. rain-forest (vine; petals dirty green; fruit 7 mm. long, 5 mm. diameter, white-green when ripe); Guadalcanal: Uulolo, Tutuve, *Kajewski* 2520, April, 1931, alt. 1200 m., rain-forest (fruit cream-colored when ripe, 8 mm. long, 5 mm. diameter); San Cristoval: Waimamura, *Brass* 2677, Aug., 1932, lowland rain-forests, common (large glabrous fleshy liane; flowers pale brown; fruit smooth, immature).

These specimens so strongly resemble each other that in spite of their wide geographic range we have placed them together for the present at least. Likewise, they correspond very well with the description of Valetton's *Psychotria olivacea*. However, in our herbarium is a specimen from Australia labeled *P. coelospermum* F. M. Bailey, lacking flowers and fruit, but which, in foliar characters, type of inflorescence, and bracts, so strongly resembles the Papuan material above cited that it seems possible these may all be representatives of the same species. We have not yet located a description of the flowers of the Australian species. Further study with more complete material is necessary to determine relationship of these specimens.

Psychotria barbatiloba sp. nov.

Planta scandens; ramulis ultimis glabris subteretibus vel obtuse angulatis; stipulis 2 cm. longis, lineari-lanceolatis, obtusiusculis, cito caducis, cicatricibus glabrescentibus; foliis 5–7 cm. longis, 2.5–4 cm. latis, apice probabiliter recurvis in sicco plerumque plicatis, acuminatis, basi obtuse cuneatis, chartaceis, utrinque glabris, nervis lateralibus utrinsecus 7–10 oblique adscendentibus, venis inconspicuis; petiolo 1–1.5 cm. longo; inflorescentiis sessilibus, trichotomis 4–6 (–10 in fructu) cm. latis, 4–6 cm. longis, breviter patenti-pubescentibus, multifloris, bracteatis; bracteis minutis triangularibus interdum apice subulatis, pubescentibus; floribus in apice ramorum brevium dense confertis subsessilibus; calyce 1 mm. longo, glabro, dentato, minute ciliolato; corolla extus minute pubescente, tubo 1.5 mm. longo intus fauce dense barbato infra glabro, lobis 5 linearibus, intus parte inferiore dense barbatis, 2–2.5 mm. longis; staminibus in fauce insertis, filamentis 1 mm. longis, antheris 1 mm. longis; stylo 3 mm. longo, glabro, stigmatibus 0.5 mm. longis, patentibus, exsertis; fructibus vix maturis, ovoideis, apice calyce coronatis, ± 4 mm. longis, 2.5 mm. diametro, extus leviter obtuse costatis; albumine paulo ruminato.

BRITISH NEW GUINEA: Palmer River, 2 miles below junction Black River, *Brass* 7215 (TYPE), July, 1936, alt. 100 m., common in ridge forests (large canopy liane; flowers white).

The general appearance of this collection is much like that of *Psychotria sarmentosa* Blume. The latter differs in the following characters: veins not so strongly ascending; flowers less crowded; flower buds more rounded than elongate; fruits larger and less crowded; bracts and calyx more spreading.

Psychotria purpurea sp. nov.

Planta scandens, inflorescentiis minute puberulis exceptis glabra; ramis striulatis, subangulatis, internodiis circiter 2 cm. longis; stipulis non visis, cicatricibus intus minute pubescentibus; foliis lanceolato-ellipticis, apice acuminatis, acumine ± 1 cm. longo, acuto, basi cuneatis, subcoriaceis, nervis lateralibus utrinsecus 6 vel 7 utrinque aequaliter manifestis, venis obscuris; petiolo circiter 1 cm. longo, gracili; inflorescentiis a basi ramosis, puberulis, 7 cm. latis, 4.5 cm. longis, cymoso-paniculatis; ramis divaricatis, tenuibus, bracteatis; bracteis lanceolatis, 2 mm. vel minus longis; floribus 1.5 mm. pedicellatis; calyce brevissimo, patenti, glabro, 4–5-angulato; corolla in alabastro tantum visa, dense puberula cinerea, intus fauce barbata; antheris probabiliter exsertis, in alabastro 1 mm. longis; fructibus glabris, subglobosis, 4 mm. diametro, immaturis.

SOLOMON ISLANDS: San Cristoval: Hinuahaoro, *Brass* 2874 (TYPE), Sept., 1932, alt. 900 m., mountain rain-forests, common (small climber; leaves thick, shining; flower white; fruit smooth, purple).

This species suggests *P. sarmentosa* Bl. but is smaller in all its parts, and the leaves are much more acuminate. Both flowers and fruits seem to be stung by insects.

Psychotria orgyalis sp. nov.

Planta scandens circiter 2 m. alta, inflorescentiis minute leviter pulverulentis exceptis glabra; ramis ultimis leviter angulatis vel in sicco compressis, internodiis 0.5–3 cm. longis; stipulis caducissimis in gemmis

tantum visis, 1 cm. longis, lanceolatis; foliis ovatis vel lanceolatis, 2.5–4.5 cm. longis, 1–1.8 cm. latis, basi cuneatis vel late acutis, apice acuminatis, chartaceis, nervis lateralibus tenuibus utrinsecus 5–7 supra manifestis, subtus prominulis, venis paucis sub lente manifestis; inflorescentiis sessilibus, 5–7 cm. longis latisque, bracteatis, bracteis linearibus, inferioribus circiter 5 mm. longis; floribus bracteolatis, sessilibus vel breviter pedicellatis, plerumque in triadibus in apice ramulorum ultimorum dispositis, alabastris tantum visis, glabris; calyce 4–5-lobato; corolla utrinque glabra; disco elongato quam calyce paulo longiore; fructibus ellipsoideis, 5 mm. longis, 4 mm. diametro; endocarpio crassiusculo; seminibus immaturis.

BRITISH NEW GUINEA: East Mount Tafa, *Brass* 4140 (TYPE), May, 1933, alt. 2100 m., foothill forest, common (small climber forming a bushy top about 2 m. above ground; leaves rather thick, with pale midrib; inflorescence greenish yellow).

Among the species of *Psychotria* already described this collection is most like *P. Wernhamiana* S. Moore and *P. Wollastonii* Wernham. It differs from both, however, in the entirely glabrous corolla; in foliar characters it seems to be intermediate between the two mentioned species. The high disk is a feature it has in common with *P. Wernhamiana* S. Moore and *P. vaccinioides* Val., a fairly rare character among the Papuan species.

Psychotria vaccinioides Val. in Gibbs, *Phytogr. & Fl. Arfak Mts.* 181. 1917.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12182, 12626, Jan., Feb., 1939, alt. 2100 and 2150 m., in shrubberies of a steep summit, and in stunted scrub on an exposed summit, mossy forest (scrambling to 1 m.; leaves concave; flowers white).

For comparison we have at hand a topotype, *Kanehira & Hatusima* 13657, in which specimen the leaves show considerable variation in size, the larger being almost as large as the smaller ones of *P. Lorentzii* Val. (the latter species being represented by *Brass* 9239 from Lake Habbema, and *Brass* 10594 from 9 km. northeast of Lake Habbema); it is true that the habit of *P. vaccinioides* Val. is more compact than that of the related species. Another character common to all three specimens cited is a relatively long disk which does not appear in either *P. Lorentzii* Val. nor in *P. densifolia* Stapf. This disk persists in the fruit and without the aid of a hand lens looks like a rather long apiculus projecting from the apex of the fruit.

Psychotria lolokiensis S. Moore, *Jour. Bot.* 67: 49. 1929, in C. T. White, *Jour. Arnold Arb.* 10: 269. 1929.

BRITISH NEW GUINEA: Rona, Laloki River, *Brass* 3671, March, 1933, alt. 450 m., gully rain-forest associations, rare; Kanosia, *Carr* 11083, Feb., 1935, forest on edge of mangrove swamp; Daru Island, *Brass* 6277, common in rain-forest margins; Tarara, Wassi Kussa River, *Brass* 8527, tidal terraces in rain-forest and mangrove contact zone; Upper Wassi Kussa (left branch), *Brass* 8630, margin of mangroves. Slender small tree 3–7 m. high, with dark glossy leaves, white peduncles, pedicels, and flowers, fruit shining red (*Carr*: reddish orange), soft and fleshy, persistent calyx-tube yellow.

This rather distinctive species ought to be compared with the type of Valeton's *Psychotria bracteosa*, the type-locality of which is Merauke. If they should prove to be the same species, Valeton's name has priority. Although the descriptions are very similar, we have hesitated to make the reduction on this alone, after seeing the similarity between *P. montensis*

S. Moore and *P. micralabastra* (Lauterb. & K. Schum.) Val., species very much alike in appearance but different in minute details.

***Psychotria chrysocarpa* sp. nov.**

Arbor usque ad 6 m. alta, glabra, vel frutex; ramis ultimis teretibus vel compressis, internodiis 1–3.5 cm. longis; stipulis 1–2 cm. longis, dimidio inferiore connatis, apice obtusis, margine libero subpectinato-pubescentibus, deciduis, cicatricibus pubescentibus, pilis rufis; foliis coriaceis, ellipticis, 4.5–12 cm. longis, 1.5–6 cm. latis, apice et basi breviter acutiusculis, novellis margine rufo-pubescentibus, pilis cito caducis, nervis lateralibus utrinsecus 8–12 utrinque prominulis, oblique patenti-adscententibus prope marginem arcuatis, reticulo laxo manifesto; petiolo 1–1.8 cm. longo, supra plano, subtus convexo; inflorescentiis 5 (in fructu usque ad 10) cm. longis, 2.5–4 cm. pedunculatis, ramosis, ramis verticillatis, verticillis 3 vel 4, bracteatis, bracteis late ovatis, 2–3 mm. longis, basi \pm connatis; floribus sessilibus vel 2–4 mm. pedicellatis; calyce cupuliformi, \pm dentato, 2.5 mm. longo; corolla crassiuscula, tubo 5 mm. longo, intus sub apice staminum basin circum dense barbato, lobis 5.5 mm. longis, lanceolato-oblongis; disco haud 1 mm. longo; filamentis circiter 2 mm. longis, antheris aequilongis, exsertis; stylo 3 mm. longo, lobis stigmaticis 2 mm. longis, 1 mm. latis; fructibus pyriformibus utrinque leviter sulcatis, levibus, 7 mm. longis, 5 mm. latis, apice calyce coronatis; pyrenis 5 vel 6 mm. longis, dorso haud costatis, apice medio leviter sulcatis, ventre planis; albumine ruminato.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass* 10989 (TYPE), Oct., 1938, alt. 2650 m., common on open banks of streams (tree 3–6 m. high; flowers white; fruits orange); Bele River, 18 km. northeast of Lake Habbema, *Brass* 11578, Nov., 1938, alt. 2350 m., in a small clearing in forest (somewhat fleshy shrub 1 m. high; flowers white).

This species is very closely related to *Psychotria lolokiensis* S. Moore or *P. bracteosa* Val. The plants are of similar habit, and the leaves are very much alike in texture, shape, and venation. The mode of branching differs in the inflorescences. In *P. lolokiensis* S. Moore the peduncle is rather long, and at its apex the branches are verticillate and for the most part similar in size, so that the main axis as such is not conspicuously marked; the branches themselves are dichotomous. In *P. chrysocarpa*, on the other hand, the branches are in whorls around a main axis. In addition to this distinguishing character, *P. chrysocarpa* differs in having ovate rather than orbicular bracts, glabrous floral axis (and branches), more markedly dentate calyx; the pubescence in the upper part of the corolla-tube is just below the apex rather than projecting from the throat, and the pyrenes are rounded on the dorsal surface rather than angled as in *P. lolokiensis* S. Moore.

***Psychotria sphaerothyrsa* Val. Bot. Jahrb. 61: 99. 1927.**

BRITISH NEW GUINEA: Sogeri, *Brass* 635, Nov., 1925, alt. about 450 m., rain-forest (tall shrub 2.5–4 m.; trunk soft and sappy; leaves glossy above).

This collection, apart from the fact that it is only in very young bud, is an excellent match for an isotype of Valetton's species which is fortunately in our herbarium. *Psychotria sphaerothyrsa* Val. was based on a

collection from Northeast New Guinea, and has previously been reported only from the type-collection.

Psychotria heterophylla sp. nov.

Frutex magnus; ramulis ultimis angulatis puberulis, internodiis 1–7 cm. longis; stipulis 1–1.3 cm. longis, puberulis, ovatis, apice breviter bi-lobatis, subpersistentibus; foliis oblongo-lanceolatis vel leviter obovato-lanceolatis vel lineari-lanceolatis, majoribus 29–33 cm. longis, 9 cm. latis, minoribus 16×6 cm. etiam $13\text{--}14 \times 1.5$ cm., tenuiter chartaceis, apice sensim longe acuminatis, acumine 1.5–3 cm. longo, angusto, basi cuneatis, supra glabris, subtus costa et nervis puberulis, nervis lateralibus in foliis majoribus utrinsecus ± 25 , in minoribus utrinsecus 15–17, utrinque prominulis, venis utrinque manifestis, reticulo supra obscuro, subtus sub lente conferto manifesto; petiolo 1.3–2.5 cm. longo, puberulo, supra canaliculato et plano; infructescentia terminali puberula, probabiliter circiter 16 cm. diametro; pedunculo 5.5 cm. longo, compresso, angulato, ramulis similibus; fructibus 1.5 mm. pedicellatis, pyriformibus, subdicoccis, 5 mm. longis, vix 5 mm. diametro, calyce minute ciliato coronatis; pyrenis dorso convexis, endocarpio extus ruguloso, intus subscrobiculato; albumine ruminato.

BRITISH NEW GUINEA: Ihu, Vailala River, *Brass 918* (TYPE), Feb., 1926, rain-forests (large bush; leaves dark and glossy above, pale beneath, fleshy, midrib on upper surface white; fruit red).

In several characters this species is similar to *Psychotria alata* Val. The latter species differs, however, in its complete glabrousness and the comparatively short branchlets of the inflorescence, as well as in its narrower leaf-base. Both have persistent stipules, although those of *P. heterophylla* are more or less broken and somewhat shredded, yet they are present on all nodes of the specimen; the main nerves of the leaves are similar, and both have the long narrow acumen at the tip of the leaf, but even under a lens the fine reticulation seen in the *Brass* collection is lacking in Schlechter's material. In Schlechter's collection the lower branches of the inflorescence are only 2 cm. long, whereas those of *P. heterophylla* are about 9 cm. long including the branching part which is about 6 cm. long and broad. In spite of the likeness between the two specimens it seems best to regard them as separate species at least until sufficient material has been collected to cover the differences between the two.

Psychotria Randiana sp. nov.

Frutex erectus 1–1.2 m. altus, sparsim ramosus; ramulis ultimis glabris, compressis, internodiis 1–7.5 cm. longis; stipulis oblongo-ovatis 2 cm. longis, 1 cm. latis, obtuse bi-dentatis, glabris; cicatricibus plerumque latis, intus leviter pubescentibus cito glabratibus; foliis leviter obovato-ellipticis, 6.5–19 cm. longis, 2.5–8 cm. latis, apice subabrupte acuminatis, acumine obtusiusculo, 7–9 mm. longo, basi circiter 7 mm. lato, basi in petiolo angustatis, glabris, firme chartaceis, nervis lateralibus utrinsecus 8–13 supra manifestis, subtus prominulis, patenti-adscententibus et arcuatis; venis et reticulo utrinque \pm manifestis; petiolo 1–2 cm. longo; inflorescentiis (pedunculo incluso) 13–15 cm. longis, pyramidalibus, bracteatis, ramis verticillatis, puberulis, divaricatis, ultimis cymosis; bracteis linearibus apice subulatis; pedunculo 5.5–7 cm. longo; pedicellis 2–3 (in fructu

–5) mm. longis; calycis tubo circiter 1 mm. longo, lobis inaequalibus linearibus 1.5–2 (–2.5) mm. longis; corollae tubo 7 mm. longo, extus glabro, intus supra medium piloso-barbato, lobis 4 mm. longis, oblongis, glabris; antheris 2 mm. longis, inclusis, filamentis 1 mm. longis; disco 1 mm. alto; stylo 9 mm. longo, glabro; stigmatibus paulo exsertis; fructibus vix maturis ovoideis, circiter 1 cm. longis, 6 mm. diametro, calyce coronatis, non costatis; albumine ruminato.

BRITISH NEW GUINEA: Murray Pass, Wharton Range, *Brass* 4607 (TYPE), July, 1933, alt. 2840 m., sporadic in forests (erect sparsely branched bush 1–1.2 m. tall; branches pale, mottled; dark smooth thick leaves, paler beneath; flowers white; soft greenish white fruit \pm 1 cm. diameter).

This species has leaves somewhat broader and fewer-nerved than those of *Psychotria nana* Val. There are also floral differences. In Valetton's species the calyx is minute; although the corolla-tube is described as equalling the lobes in length, unless the flower were approaching anthesis the proportionate length of the two would be difficult to estimate, for the tube elongates as the flower develops. In *P. Randiana* the calyx-lobes are obvious even in fruit, the flower is relatively large, and the inflorescence is fairly long-pedunculate. The species is named for Dr. A. L. Rand, the ornithologist of the expedition.

Psychotria Kanehirae sp. nov.

Planta 3 m. alta; ramulis glabris, internodiis 1–2 cm. longis, compressis; stipulis membranaceis, 1.7 cm. longis, basi circiter 8 mm. latis, ad medium bifidis, lobis lanceolatis, acutis, extus glabris, intus basi pubescentibus, caducis, cicatricibus hirtellis; foliis 10–16.5 cm. longis, 4.5–6 cm. latis, etiam 7×1.8 cm., ellipticis vel leviter oblanceolato-ellipticis, apice acuminatis, acumine 1–1.5 cm. longo, basi 7–10 mm. lato, acutiusculo, valde chartaceis vel tenuiter coriaceis, supra glabris subtus novellis costa patentipubescente excepta glabris, maturis glabris, nervis lateralibus utrinsecus \pm 14, oblique patentibus deinde arcuatis, reticulo sub lente supra vix manifesto, subtus obscuro; petiolo 1–2.3 cm. longo; inflorescentiis terminalibus, circiter 8 cm. longis, cymoso-paniculatis, pedunculatis (pedunculo 2 cm. longo), bracteatis, bractea basi rami imi foliiformi 1.2 cm. longa, 2 mm. lata, axilla pubescente, bracteis reliquis 2 mm. longis vel minus, linearibus; ramis plerumque oppositis, divaricatis, ramo imo 3.5 cm. longo, paniculato, summo 1.5 cm. longo, iteratim ramoso; floribus solitariis vel in triadibus in apice ramulorum ultimarum, \pm 1.5 mm. pedicellatis, glabris; calyce 0.5 mm. longo, 5-dentato; corollae tubo 1 mm. longo, intus fauce barbato, lobis 1 mm. longis, obtusiusculis; antheris partim exsertis; stylo 2 mm. longo; fructibus non visis.

NETHERLANDS NEW GUINEA: Dalman, 45 km. inland from Nabire, *Kanehira & Hatusima* 12248 (TYPE), Mar., 1940, alt. 500 m., margin of forest (plant 3 m.; flowers white).

In foliar characters and size of stipules this plant strongly suggests *P. ramulosa* Merr. & Perry, but the flowers are very much smaller in this plant. The stipules here are thin enough to show striations. The branches of the inflorescence are opposite, whereas in *P. ramulosa* they tend to be verticillate. It is interesting to note that the lower bract is leaf-like, though very small, and also that the axil is pubescent just as one

would expect if a stipule had fallen. Whether this indicates a sessile branching inflorescence at times we cannot say.

Psychotria luteola sp. nov.

Arbor parva 3 m. alta; ramulis ultimis glabris, internodiis 1–3 cm. longis, superioribus subangulatis vel sulcatis; stipulis in gemma terminali 5 mm. longis tantum visis, caducissimis, verisimiliter lanceolatis vel ovatis, cicatricibus primum subsuberosis deinde obsolete pubescentibus; foliis ellipticis, 10–18 cm. longis, 5.5–9.5 cm. latis, apice acuminatis, acumine \pm 1 cm. longo, acuto, basi obtusis, firme chartaceis, utrinque glabris vel subtus minute puberulis, nervis lateralibus utrinsecus 10–13 supra impressis, subtus prominentibus, venis inconspicuis, reticulo sub lente densissimo, vix manifesto; petiolo 1.5–2 cm. longo; inflorescentiis sessilibus trichotomis, 12–14 cm. longis, \pm 10 cm. latis, cymoso-paniculatis, puberulis; floribus in apice ramulorum ultimorum plerumque 3, sessilibus vel exterioribus vix 1 mm. pedicellatis; calyce valde 5-dentato, calyce et ovario circiter 1 mm. longis, puberulis; corollae tubo 1.5 mm. longo utrinque glabro, lobis 1 mm. longis, extus minute puberulis; antheris 0.8 mm. longis, dimidio supero exsertis; stylo 1.5 mm. longo.

BRITISH NEW GUINEA: Mafulu, *Brass 5226* (TYPE), Oct., 1933, alt. 1250 m., undergrowth of limestone belt forests (straggling small tree 3 m. high; leaves dull; terminal panicles of small yellow flowers).

A species closely related to *P. sogerensis* Wernh. but with a flower half the size, a glabrous corolla, and definitely acuminate leaves.

Psychotria chrysantha sp. nov.

Arbor parva cicatricibus stipularum pubescentibus exceptis glabra; ramis ultimis compressis vel sulcatis, internodiis 0.5–2.5 cm. longis; stipulis caducissimis, ovatis acuminatis, in gemmis tantum visis; foliis ellipticis vel leviter obovatis, 4–10 cm. longis, 1.5–4 cm. latis, firme chartaceis, apice acuminatis, acumine 5–10 mm. longo, acutiusculo, basi cuneatis, nervis lateralibus utrinsecus 10–12 supra manifestis, subtus prominulis, patentibus prope marginem arcuatis, venis inconspicuis; petiolo 7–12 mm. longo; inflorescentiis 7–10 cm. longis, pedunculatis, pedunculo 2–4 cm. longo vel interdum nullo, cymoso-paniculatis; floribus sessilibus vel breviter pedicellatis; calyce circiter 0.5 mm. longis, plerumque 4-lobatis; corollae tubo vix 1.5 mm. longo utrinque glabro, campanulato, lobis circiter 1 mm. longis, ovatis, intus minute papillulatis; antheris in fauce insertis, apice exsertis; stylo brevi; fructibus subpyriformibus, 5 mm. longis, apice circiter 4 mm. latis, pyrenis fere levibus; albumine ruminato.

BRITISH NEW GUINEA: Mount Tafa, *Brass 4881* (TYPE), Aug. 1933, alt. 2400 m., forest substage (small tree with pale green leaves; small yellow flowers; smooth green fruits).

Psychotria chrysantha is closely related to *P. micralabastra* (Lauterb. & K. Schum.) Val. but the venation of the leaves is more spreading and prominent; the leaves also are broader and less tapering at the base in our species.

Psychotria myrsinoides sp. nov.

Frutex haud 1 m. altus; ramulis novellis minute puberulis cito glabris, internodiis 1–4 cm. longis, superioribus subsulcatis; stipulis 5–8 mm. longis, 4–6 mm. latis, ovatis, apice obtusis vel erosis vel bidentatis, extus puberulis,

intus pubescentibus, caducis; foliis 5.5–13 cm. longis, 2.5–4.5 cm. latis, tenuiter coriaceis, oblongo-lanceolatis vel elliptico-lanceolatis, apice acutis vel breviter acuminatis, basi cuneatis, nervis lateralibus utrinsecus 9–12 utrinque manifestis non prominulis, patentibus, venis obscuris; petiolo 0.5–1.5 cm. longo, puberulo; inflorescentiis paniculatis, puberulis, 6–10 cm. longis, 4–7 cm. latis, pedunculo 2–5 cm. longo, ramis oppositis vel 4-verticillatis, verticillis 4 vel 5, bracteis lanceolatis subulatis \pm 2 mm. longis; floribus in apice ramulorum ultimorum \pm confertis, extus dense puberulis, sessilibus vel breviter pedicellatis; calyce valde 5-lobato, lobis vix 1 mm. longis, ovatis, acutis; corollae tubo 3 mm. longo, intus tertio supero et fauce dense barbatis, lobis 1.5 mm. longis, oblongis; antheris 1 mm. longis, inclusis; fructibus subglobosis, \pm 4 mm. diametro; pyrenis dorso leviter 3-costatis, ventre planis; albumine ruminato.

NETHERLANDS NEW GUINEA: Hollandia, *Brass* 8810 (TYPE), June, 1938, alt. 20–100 m., occasional in small forest patches on secondary savannas (fleshy shrub under 1 m. high; flowers and fruit white).

This plant suggests *P. pallida* Val. but the leaves and inflorescence are smaller, the venation of the leaves is less conspicuous, and the base is cuneate rather than rounded and abruptly constricted.

Psychotria tafaensis sp. nov.

Arbor 3–4 m. alta, fere glabra; ramulis ultimis compressis, crassiusculis, circiter 5 mm. diametro, internodiis 1–1.5 cm. longis; stipulis rotundato-oblongis, 1–1.4 cm. longis, 5–9 mm. latis, deciduis, cicatricibus novellis crassiusculis, intus dense pilosis; foliis oblongis utrinque angustatis, apice acutis, basi cuneatis, margine leviter recurvis, 5–13 cm. longis, 1.8–5 cm. latis, firme chartaceis vel subcoriaceis, nervis lateralibus utrinsecus 8–13 utrinque prominulis, patenti-adscentibus marginem versus arcuatis, venis inconspicuis; petiolo 1–1.3 cm. longo; inflorescentiis 7–8 cm. longis, 4.5–6 cm. latis, interdum pedunculatis (pedunculo 2.5–3 cm. longo) vel a basi ramosis, pyramidalibus, bracteatis, bracteis lanceolatis, ramulis verticillatis vel trichotomis, ramulis ultimis cum rhachi summo puberulis; floribus breviter pedicellatis; calyce 5-lobato, vix 2 mm. longo, lobis ovatis; corollae tubo extus glabro, intus fauce dense barbato, 4 mm. longo, lobis oblongis, circiter 3 mm. longis; antheris inter pilos insertis, verisimiliter sessilibus, apice leviter exsertis; stylo 4 mm. longo; fructibus subglobosis, 7 mm. longis, 6 mm. diametro, leviter costatis; pyrenis transverse sectis fere semi-orbicularibus, dorso leviter trisulcatis; endocarpio subcorneo; albumine ruminato.

BRITISH NEW GUINEA: Mount Tafa, *Brass* 4838 (TYPE), May–Sept., 1933, alt. 2400 m., bank of forest stream, common (small loosely branched tree 3–4 m. tall; flowers white).

Psychotria ramulosa sp. nov.

Arbor parva 2–4 m. alta valde ramosa, glabra; ramulis subteretibus, internodiis 2–4 cm. longis; stipulis magnis, late ellipticis, versus apicem angustatis, 2 cm. longis, 1.2–2 cm. latis, basi leviter angustioribus, tertio supero bifidis, intus parte inferiore pubescentibus, caducis; foliis valde chartaceis, ellipticis vel oblanceolato-ellipticis, 6.5–21.5 cm. longis, 2.2–8.5 cm. latis, apice sensim vel subabrupte acuminatis vel foliis minoribus acutis, acumine 1–1.5 cm. longo, acutiusculo, basi elongato-cuneatis, nervis lateralibus tenuibus utrinsecus 8–15 supra manifestis, subtus prominulis

venis inconspicuis vel subobscuris; petiolo 1-3 cm. longo, gracili; inflorescentiis laxe cymoso-paniculatis pyramidalibus pedunculatis (pedunculo 5-10 cm. longo), 13-27 cm. longis, 10-25 cm. latis, ramis oppositis vel 4- vel 8-verticillatis, patentissimis, bracteatis, bracteis lineari-lanceolatis, acutis; floribus in apice ramulorum ultimorum \pm 3 mm. pedicellatis; calyce vix 1 mm. longo, 4- vel 5-dentato; corollae tubo 6 mm. longo, intus tertio infimo excepto villosulo; lobis 2 mm. longis, intus minute papilloso-puberulis; staminibus in fauce insertis, antheris 1.5 mm. longis, partim exsertis; stylo glabro, 3 mm. longo; fructibus obovoideis vel pyriiformibus, 6 mm. longis, 4 mm. latis, leviter sulcatis; pyrenis leviter 3-sulcatis; albumine extus paulo lobatis vix ruminatis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12396 (TYPE), Jan., 1939, alt. 1500 m., common in undergrowth of a rain-forest ravine (much branched tree 2-4 m. high; inflorescence white; fruit green).

Possibly this species is related to *Psychotria nana* Val. The latter is described as a large herb, whereas this is a small tree with flowers on pedicels about 3 mm. long. The flowers of *P. nana* Val. were not mature and so they are hardly comparable. The stipules also are striking in the *Brass* specimen but are incomplete in *P. nana* Val. From the description it would seem as if Valeton's species should be recognized by the obovate-lanceolate multinerved leaves, and an inflorescence, a little longer than the leaves, bearing long-pedicellate (6 mm.) flowers.

Psychotria aquatilis sp. nov.

Frutex vel arbor parva; ramulis ultimis glabris, compressis, vix 5 mm. diametro, internodiis 2.5-6 cm. vel longioribus; stipulis circiter 1 cm. longis, connatis, apice tantum liberis, glabris, cicatricibus \pm pubescentibus; foliis 19-31 cm. longis, 4-10 cm. latis, lanceolatis, chartaceis, utrinque aequaliter angustatis, apice breviter acute acuminatis, basi breviter decurrentibus, supra glabris, subtus costa nervisque rufo-pubescentibus, nervis lateralibus utrinsecus 12-16 adscendentibus leviter arcuatis, supra impressis, subtus prominentibus, reticulo laxo utrinque distincte manifesto; petiolo 1-1.5 cm. longo, glabro; infructescentiis 5-8 cm. longis, 7-8 (fructibus inclusis) cm. latis, pedunculatis; pedunculo 0.7-1.5 cm. longo; axi et ramis minute et dense patenti-pubescentibus vel dense puberulis; ramis verticillatis, verticillis 2; fructibus pedicellatis; pedicellis 3 mm. longis, puberulis; fructibus in sicco subpyriiformibus, \pm 1 cm. longis, 9 mm. latis, consperse minute pubescentibus, calyce truncato undulato leviter patenti coronatis; pyrenis 1 cm. longis, 9 mm. latis, basi cuneatis, levibus, dorso convexis basin versus compressis, ventre planis, albumine ruminato.

BRITISH NEW GUINEA: Fly River, 528 mile Camp, *Brass* 6667 (TYPE), May, 1936, alt. 80 m., abundant on river flood banks and backwater creeks (gregarious shrub or small tree; leaves shining; short terminal panicles; fleshy red fruit \pm 1.5 cm. diameter).

Possibly this species is related to *Psychotria papuana* (Wernh.) St. John. The leaves are somewhat similar in outline but tend to be narrower than those shown in the plate of the latter species; also the veins are more ascending, the petiole is longer, and the peduncle is very much shorter than in *P. papuana*. The plants differ in other characters, noticeably the apparent lack of a calyx in the Forbes collection, but we cannot suggest at present any more closely related species.

Psychotria paludicola sp. nov.

Arbor 2–4 m. alta; ramulis ultimis glabris compressis; stipulis non visis, cicatricibus suberosis margine brunnescenti-pubescentibus; foliis firme chartaceis, ellipticis vel oblongis, 9–21 cm. longis, 4–9 cm. latis, apice subabrupte acuminatis, acumine \pm 1 cm. longo basi 7–8 mm. lato, basi late cuneatis, utrinque glabris, nervis lateralibus utrinsecus 12–14, patenti-arcuatis, utrinque prominulis, venis et reticulo laxo utrinque manifestis sed inconspicuis; petiolo 1–2.5 cm. longo glabro; inflorescentiis terminalibus \pm 9 cm. diametro, in fructu tantum visis; pedunculo brevi, 0.5–1.5 cm. longo, ramis 2- vel 3-ramulosis; fructibus 2–4 mm. pedicellatis, subglobosis, circiter 1 cm. diametro, calyce dentato coronatis; pyrenis circiter 7 mm. diametro, ventre planis, dorso convexis basim versus leviter compressis et late et obtuse costatis; albumine ruminato.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass* 13637 (TYPE), March, 1939, alt. 850 m., rain-forest, abundant on banks of streams and on swampy ground (tree 2–4 m. high; fruit white, soft and fleshy).

The species is probably related to *Psychotria apiculata* Warb. The infructescence is only about half as large as in the latter species, but both are apparently without bracts; both have corky stipular scars, but in our species the upper scars all have an upper hairy margin; the leaves have fewer lateral nerves and the acumen is twice as large as in Warburg's species.

Psychotria misimensis sp. nov.

Planta glabra; ramulis teretibus, internodiis 2–2.5 cm. longis, superis tantum visis; stipulis oblongis, obtusis, 4 mm. longis, caducis, cicatricibus dense rufo-pubescentibus; foliis tenuiter coriaceis, obovatis, 5.5–9 cm. longis, 2–3.7 cm. latis, apice breviter acuminatis, acumine vix 5 mm. longo, obtuso, basi sensim attenuato-acute, nervis lateralibus utrinsecus 8–10 utrinque distincte manifestis, patentibus deinde arcuatis, reticulo laxo inconspicuo; petiolo \pm 1 cm. longo; inflorescentiis circiter 9 cm. longis, 5 cm. latis, cymoso-paniculatis, pedunculatis (pedunculo 4.5 cm. longo), bracteatis; bracteis linearibus vel subulatis; ramis oppositis; ramulis ultimis, pedicellis, bracteis, et calycibus minute puberulis; floribus saepe in apice ramulorum ultimorum congestis; calycis tubo 0.5 mm. longo, lobis 1 mm. longis, acutis; corollae tubo 4 mm. longo, intus fauce villosulo, lobis 3 mm. longis, intus granulati-puberulis in sicco albescentibus; antheris 1.5 mm. longis, linearibus, apice tantum exsertis; stylo fere 7 mm. longo, granulati-puberulo; stigmatibus vix 1 mm. longis; fructibus non visis.

NORTHEAST NEW GUINEA: Mt. Misim, Mowlee District, *Stevens* (TYPE), 1932–33, alt. \pm 1700 m.

The distinctive characters of this species are the oblong stipules with a rounded or obtuse apex, obovate leaves, and fairly large flowers with whitened corolla-lobes.

Psychotria membranifolia Bartl. ex DC. Prodr. 4: 522. 1830; Merr. Enum. Philip. Fl. Pl. 3: 559. 1923.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8051, Oct., 1936, rain-forest (weak sparsely foliated small tree of undergrowth; leaves rather thick and fleshy; flowers cream-colored); Penzara, between Morehead and Wassi

Kussa Rivers, *Brass* 8463, rain-forest along streams (shrub 1.5 m.; flowers yellow); Dieni, Ononge Road, *Brass* 4008, May, 1933, alt. 500 m., rain-forest floor (very small white-flowered shrub 30 cm. high); Kubuna, *Brass* 5588, Nov. 1933, alt. 100 m., rain-forest regrowths (small tree with pale glabrous shining leaves and cream-colored flowers); Veiya, *Carr* 11708, 11709, Mar., 1935, forest (shrub about 2 m. tall; flowers pale olive below, the upper half pale flesh color); Koitaki, *Carr* 12642, June, 1935, alt. 450 m.

The above material is so much like some of the Philippine material of this species at hand that we have hesitated to consider it as new. It is true that most of the leaves are smaller here (9–20 cm. long, 3.5–8 cm. broad), the peduncle of the inflorescence is longer, and the inflorescence is much less compact, further, all the material is glabrous, but these are only minor characters when one considers the texture of the leaves, the likeness in the flowers, and some fruits; unfortunately we have only two specimens in fruit and one is immature, so it is hardly comparable.

Psychotria leiophloea sp. nov.

Arbor usque ad 7 m. alta, inflorescentiis puberulis exceptis glabra; ramulis pallidis, ultimis valde compressis, levibus, internodiis 1.5–3.5 cm. longis; stipulis elliptico-ovatis, circiter 8 mm. longis, 5 mm. latis, cito caducis, cicatricibus paulo pubescentibus; foliis ellipticis, tenuiter chartaceis, 10–21.5 cm. longis, 4–10.5 cm. latis, apice acutis vel breviter et late acuminatis, basi obtuse cuneatis, nervis lateralibus utrinsecus 10–12 utrinque perspicuis, patentibus, prope marginem valde arcuatis, venis distincte manifestis, reticulo obscuro; petiolo 1–3 cm. longo; inflorescentiis paniculatis, puberulis, circiter 13 cm. diametro, pedunculo \pm 5 cm. longo, bracteatis, bracteis caducissimis haud visis; ramis 4-verticillatis; floribus in apice ramulorum confertis, sessilibus vel brevissime pedicellatis; calyce puberulo 0.5 mm. longo, leviter 5-dentato; corolla extus glabra, tubo 3 mm. longo, intus dimidio supero dense barbato, lobis 1.5 mm. longis; antheris 1 mm. longis, apice vix exsertis; stylo 4.5 mm. longo; fructibus subglobosis, 5 mm. longis, 4 mm. diametro; pyrenis dorso convexis inconspicue 3-costatis ventre planis utrinque rugulosis; albumine paulo ruminato.

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, *Brass* 8506 (TYPE), Dec., 1936, common in rain-forest semi-shade (shapely tree 6–7 m. high; bark smooth, white; leaves coriaceous, nerves pale; panicles white); Wuroi, Oriomo River, *Brass* 5899, Feb., 1934, alt. 10–30 m., common about rain-forest borders and often found on savannas (small tree or little more than a bush 2.5–4 m. high; smooth leaves with prominent yellowish nerves; stiff panicles of small red fruit).

In some respects the species reminds us of *P. micrococca* (Lauterb. & K. Schum.) Val. but in our species the corolla is glabrous outside, the bracts of the inflorescence have fallen or are very minute for there is only a hairy margin left, the flower is somewhat larger, the fruits are only inconspicuously ribbed, and the albumen is only a little ruminant.

Psychotria axilliflora sp. nov.

Arbor 10–12 m. alta; ramulis glabris, internodiis 6–12 cm. longis, superis sulcatis, cito teretibus; stipulis tantum in gemma terminali visis. parvis glabris, cicatricibus non pubescentibus; foliis 13–23 cm. longis, 5–8.5 cm. latis, chartaceis, ellipticis, apice acuminatis, acumine 1–1.5 cm. longo, obtusiusculo, basi rotundato-cuneatis vel obtusis, utrinque glabris,

nervis lateralibus utrinsecus 11–15 supra distincte manifestis, subtus prominentibus, oblique patentibus prope marginem arcuatim confluentibus, venis gracilibus, reticulo laxissimo utrinque inconspicuo; petiolo \pm 1.5 cm. longo; inflorescentiis axillaribus vel terminalibus, pedunculatis, cymosopaniculatis, puberulis, minute bracteatis; pedunculo 3–5.5 cm. longo, gracili, ramis 1–2.5 cm. longis; floribus non visis; fructibus 1 cm. longis latisque puberulis, apice calyce truncato 1 mm. longo coronatis, in parte infera leviter dorsiventraliter compressis, basi in ambitu rotundato-cuneatis, in dimidio supero sensim vel subabrupte angustatis et subcostatis, in sectione transverse 4-angulatis; pyrenis vix 1 cm. longis latisque ventre planis, dorso convexis in dimidio supero leviter costatis (deorsum costa obscura) deinde basi valde compressis et latioribus; albumine ruminato.

SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski 2018* (TYPE), Aug., 1930, alt. 900 m., rain-forest (small tree up to 12 m. high; fruit orange colored when ripe, length 1.1 cm., diameter at base 1.2 cm. tapering to a diameter of 7 mm. at blunt point); same locality, *Kajewski 2055*, alt. 950 m., rain-forest (tree 10 m. high; fruit shiny red when ripe, 9 mm. long, 1 cm. diameter).

The leaves of this species are very much like those of *P. leptothyrsa* Miq. and *P. Schmielei* Warb. but the fruits are more nearly like those of the subgenus *Piptilema* A. Gray, described from Fiji. The dry fruits are broad and compressed basally, upward they are either gradually or subabruptly narrowed, and in cross section they are 4-angled. Of the five infructescences on the two specimens at hand, only one seems to be terminal on a short (2 cm. long) axillary branch.

Psychotria inconspicua sp. nov.

Planta vix 1 m. alta, non ramosa, glabra; internodiis apicem versus 0.5 mm. longis, subangulatis, deorsum 1–2.5 cm. longis; stipulis 1.5 mm. longis, apice rotundatis, caducis; foliis 9–11 (–19.5) cm. longis, 3.2–4 (–7) cm. latis, anguste obovatis, vel ellipticis, apice breviter acuminatis, basi sensim anguste cuneatis, tenuiter chartaceis, nervis lateralibus utrinsecus 8–10, supra impressis, subtus prominulis, venis costalibus inter nervos conspersis, supra inconspicuis, subtus distincte manifestis, reticulo laxissimo subtus perspicuo; petiolo 4 (–10) mm. longo; inflorescentiis 5.5 cm. pedunculatis, ramosis; ramis verticillatis, verticillis 3; ramis ramulosis; floribus in apice ramulorum breviter pedicellatis; calyce vix 1 mm. longo, 4-angulato; corollae tubo subcampanulato 3.5 mm. longo, fauce puberulo vel pubescente, lobis 4, ovatis, obtusis, 1.5 mm. longis; antheris circiter 1 mm. longis, partim exsertis; fructibus non visis.

BRITISH NEW GUINEA: Palmer River, 2 miles below junction Black River, *Brass 7045* (TYPE), June, 1936, alt. 100 m., sporadic in ridge-forest undergrowth (unbranched shrub less than 1 m. high; leaves somewhat iridescent; flowers white).

A species possibly related to *P. leptothyrsa* Miq. but much smaller in size of flowers and upper leaves, and with more crowded nodes.

Psychotria dieniensis sp. nov.

Frutex 50–60 cm. altus; ramulis ultimis dense pilosis, pilis leviter crispis; stipulis 1.7 cm. longis, patenti-pilosis, apice bilobatis, lobis subulato-lanceolatis circiter 7 mm. longis, caducis; cicatricibus brunnescenti-pilosis; foliis lanceolatis basi et apice aequaliter angustatis, longe subacutis, 6.5–15 cm. longis, 2–4 cm. latis, supra costa prope basim pilosa excepta glabris,

subtus minute, costa et nervis dense pilosis, nervis lateralibus utrinsecus 10–14 supra manifestis, subtus prominulis, venis subobscuris; petiolo 1.2–1.7 cm. longo, gracili, breviter piloso; infructescentiis 2.5–3.5 cm. longis latisque, propè basim ramosis, patenti-pilosis, ramis 2- vel 3-ramosis, bracteolis linearibus; fructibus rotundatis circiter 7 mm. diametro, extus leviter costatis, apice calyce consperse piloso 5-dentato 2 mm. longo coronatis, sparsissime pilosis; pyrenis 5 mm. longis, 4 mm. latis, ventre planis, dorso obtuse et inconspicue 3-costatis; albumine ruminato.

BRITISH NEW GUINEA: Dieni, Ononge Road, *Brass 3827* (TYPE), April, 1933, alt. 500 m., rain-forest floor (shrub 50–60 cm.; leaves paler beneath, margins slightly recurved; globose white fruit \pm 1 cm. diameter).

Psychotria dieniensis in some ways suggests *P. multicostoides* Val.; however, the pubescence is still on the upper parts of the fruiting specimens at hand and is too heavy to pass as either fugacious or puberulous, while the whole surface of the stipules is hairy, not just the margin. There is a great similarity between the characters of the leaves of both species, but in our species the fruit is crowned by the calyx, which has five pubescent lobes, and the disk is slight and inconspicuous, whereas in Valeton's species the fruit is crowned by the disk, a feature suggesting that the calyx is rather small and insignificant.

Psychotria camptodroma sp. nov.

Frutex; ramulis ultimis villosis cito glabrescentibus, internodiis 1–6 cm. longis; stipulis ovatis, circiter 2 cm. longis, villosis deinde glabrescentibus, apice bifidis, lobis 6–7 mm. longis, lineari-lanceolatis; cicatricibus subvillosis; foliis 6–12 cm. longis, 3–5 cm. latis, late oblongis, apice breviter acuminatis, acumine lato et obtuso, basi cuneatis, supra glabris, subtus sparsim rufo-pilosis, nervis lateralibus utrinsecus 9–12, supra impressis, subtus prominentibus, patentibus deinde arcuatim anastomosantibus, venis paucis sub lente utrinque manifestis; petiolo 1–2 cm. longo, dorso glabrescente; inflorescentiis (in fructu) circiter 6 cm. longis (pedunculo 2–2.5 cm. longo incluso), 4 cm. latis, axi et ramis breviter villosis; floribus pedicellatis, pedicellis \pm 3 mm. longis; calyce et ovario glabrescentibus, calycis lobis 4, ovatis, circiter 1.5 mm. longis, corollae tubo 9 mm. longo, utrinque glabro, lobis 4, triangularibus, 4 mm. longis, extus apice interdum paulo pubescentibus; staminibus supra basin 6 mm. insertis, filamentis circiter 1.5 mm. longis, antheris vix 2 mm. longis; stylo 9 mm. longo, stigmatibus lineari-oblongis; fructibus subglobosis, circiter 7 mm. diametro, calyce coronatis, immaturis; albumine ruminato.

BRITISH NEW GUINEA: Mount Tafa, *Brass 5102* (TYPE in Herb. New York Bot. Gard.), Sept., 1933, alt. 2400 m., bush in valley forest, rare (leaves dark and shining, nerves deeply impressed above, prominent beneath; flowers white).

Psychotria camptodroma is to be distinguished from *P. malacorrhax* (Lauterb. & K. Schum.) Val. by the pubescence on the lower surface of the leaves and by the lobed calyx. Both are species with short inflorescences and large flowers.

Psychotria malaloensis sp. nov.

Probabiliter frutex; ramulis dense patenti-pilosulis, pilis rufis, demum glabratibus, internodiis superis 1–3.5 cm. longis; stipulis 6–8 mm. longis,

basi connatis, apice bifidis, bi-costatis, extus dense pilosulis, lobis attenuatis filiformibus, in ramulis novellis subpersistentibus; foliis oblongo-lanceolatis vel anguste ellipticis, 4.5–9 cm. longis, 2.2–3.5 cm. latis, apice leviter acuminatis, summo apice obtusiusculis, basi obtusis, subcoriaceis, supra glabris, subtus consperse costa nervisque dense patenti-pilosulis, nervis lateralibus utrinsecus 7 vel 8, supra impressis, subtus prominulis, venis tenuibus inconspicuis; petiolo 5–7 mm. longo, crassiusculo, dense patenti-pilosulo; inflorescentiis totis patenti-pubescentibus, immaturis 2 cm., in fructu 3 cm. longis, basi trichotomis, ramis \pm 1 cm. longis in apice 1 vel 3 flores ferentibus; floribus circiter 3 mm. pedicellatis; calyce \pm 3 mm. longo, tubo campanulato, lobis 1.5 mm. longis, 2 mm. latis, patentibus; corolla valde immatura, fauce villosula; fructibus pyriformibus, 12 mm. (calycis tubo incluso) longis, 7 mm. diametro, sparsim pubescentibus, pyrenis 9 mm. longis, 6 mm. latis, obovatis, apice leviter concavis, dorso convexis, ventre planis; albumine subruminato.

NORTHEAST NEW GUINEA: Malalo Mission, *Clemens* 4412 (TYPE), Nov., 1936, alt. 600 m.

The fruit of this species is similar in shape to that of *P. diplococca* (Lauterb. & K. Schum.) Val. but the leaves are very much smaller and have many less nerves.

Psychotria ihuensis sp. nov.

Frutex parvus; ramulis ultimis patenti-pubescentibus, pilis rufis, internodiis 2–5 cm. longis; stipulis 2–2.5 cm. longis, ultra medium bifidis, basi triangulari dense pubescentibus, lobis alatiformibus glabris margine pubescentibus, deciduis; foliis valde chartaceis, 18–22 cm. longis, 5.5–8.5 cm. latis, ellipticis, basi elongato-cuneatis, apice acuminatis, supra glabris, subtus costa dense, nervis sparsim pubescentibus, nervis lateralibus utrinsecus 15 vel 16 utrinque perspicuis, venis inconspicuis; petiolo 2 cm. longo, in sicco supra bisulcato, subtus convexo pubescente; inflorescentiis circiter 5 cm. longis latisque, pedunculatis (pedunculo vix 1.5 cm. longo), tantum cum fructibus immaturis visis, fructibus (calyce excluso) glabris reliquis pubescentibus, pilis rufis patentibus; ramis 4-verticillatis vel superioribus oppositis; bracteis linearibus 1–5 mm. longis; ramulis ultimis brevissimis; fructibus 1–1.5 mm. pedicellatis, apice calyce persistente coronatis; calyce valde 5–6-dentato, dentibus acutis; albumine probabiliter ruminato.

BRITISH NEW GUINEA: Ihu, Vailala River, *Brass* 962 (TYPE), Feb., 1926, rain-forest (softwood shrub; leaves somewhat fleshy).

This collection was previously reported, Jour. Arnold Arb. 14: 65. 1933, as *Psychotria polyneura* Val. vel aff. It differs in several characters from that species; in this new species the stipules are split beyond the middle, the thickened basal triangular part is pubescent on both surfaces, the rest of the stipule is thinner in texture and pubescent only on the margin, each lobe being somewhat like a wing attached to the sides of the triangular pubescent part, the veins are mostly inconspicuous except for the main one which splits, each branch lying fairly close to the inner margin of each lobe, the nerves ascending rather than spreading, and the inflorescence is densely pubescent and the bracts are linear. The specimen more nearly answers the description of *P. ochnidiophora* Wernh. but in the latter the

inflorescence is much more ample, and the calyx-lobes are three times as long.

Psychotria dolichosepala sp. nov.

Frutex 1.5 m. altus; ramulis ultimis compressis rufo-pubescentibus, internodiis 1–8 cm. longis, stipulis 1.2–2.5 cm. longis, 5–9 mm. latis, bifidis, extus \pm pubescentibus, intus dense pubescentibus, fere villosis, lobis 5–8 mm. longis, lineari-lanceolatis, subpersistentibus; foliis 5.5–13 cm. longis, 2.5–5.5 cm. latis, ellipticis vel lanceolatis, utrinque angustatis, apice obtuse acuminatis, basi acutis, supra glabris, subtus sparsim, nervis venisque dense rufo-pilosulis, nervis lateralibus utrinsecus 11–16 arcuato-patentibus prope marginem adscendentibus et interdum confluentibus, supra impressis, subtus prominentibus, venis et reticulo supra manifestis, subtus vix prominulis; petiolo 1–2 cm. longo, pubescente vel glabrato; inflorescentiis in alabastro 4 cm. (in fructu 4.5 cm.) longis, trichotomis, pedunculatis, pedunculo 1–1.5 cm. longo, ex toto (corollae tubo excepto) rufo-pubescentibus; bracteis linearibus; floribus breviter pedicellatis; ovario circiter 3 mm. longo, oblongo; calyce 4 mm. longo, 5-fisso, lobis angustatis, elongatis; corolla tantum in alabastro visa, tubo extus glabro intus dimidio superiore barbato-pilosulo, lobis extus pubescentibus; antheris probabiliter exsertis; fructibus ellipsoideis, 7 mm. (calyce incluso 11 mm.) longis, 5 mm. latis, pubescentibus, calyce coronatis, medianis leviter sulcatis; pyrenis fere levibus, 6 mm. longis, 5 mm. latis, dorso convexis, ventre planis, albumine ruminato.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10871* (TYPE), Oct., 1938, alt. 2700 m., forest undergrowth in valley bottom (shrub 1.5 m.); Bele River, 18 km. northeast of Lake Habbema, *Brass 11224*, Nov., 1938, alt. 2300 m., frequent in forest undergrowth (flowers white).

In several characters this species is similar to *Psychotria Wichmannii* Val. The latter differs in having larger leaves with prominent venation, much larger inflorescence, and costulate pyrenes.

Psychotria dolichosepala forma glabra forma nov.

A forma typica differt planta glabra; stipularum cicatricibus tantum rufo-pubescentibus; foliis saepe acute acuminatis, venis inconspicuis; infructescentiis paulo latioribus (6 cm. latis); antheris inclusis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12096* (TYPE of form), Jan., 1939, alt. 1800 m., occasional in mossy forest seral growths (shrub 1 m. high; flowers white).

Apart from the lack of pubescence this collection very closely resembles the species described above. Possibly it is only a variation brought about by altitude or by habitat.

Psychotria trichocarpa Val. Bot. Jahrb. 61: 100. 1927.

BRITISH NEW GUINEA: Wuroi, Oriomo River, *Brass 5720*, Jan., 1934, alt. 10–20 m., light rain-forest (low spreading shrub under 1 m. high; leaf-nerves prominent and whitish beneath; flowers white).

Although the type came from Northeast New Guinea at 600 m. altitude, the habit is so striking and our specimen fits the original description so well that we have no hesitancy in assigning it to this species.

Psychotria balimensis sp. nov.

Frutex parvus, 1 m. altus, inflorescentiis exceptis glaber; ramis cinereis, teretibus, longitudinaliter sulcatis, internodiis 5–15 mm. longis; stipulis 7–9 mm. longis, elongato-ovatis, apice acutiusculis, caducis, cicatricibus pubescentibus; foliis leviter obovato-oblongis vel elliptico-oblongis, 3.5–8.5 cm. longis, 1.5–3.5 cm. latis, apice acutis vel breviter acuminate fere apiculatis, basi cuneatis, valde chartaceis, nervis lateralibus utrinsecus 10–15 patentibus prope marginem arcuatis, utrinque prominulis, venis subobscuris vel manifestis; petiolo \pm 5 mm. longo; inflorescentiis 3–6 cm. longis, pedunculatis, pedunculo 1.5–2.5 cm. longo, axi et ramis puberulis, ramis verticillatis; floribus glabris, sessilibus vel subsessilibus; calyce undulato, circiter 0.5 mm. longo; corollae tubo 2.5 mm. longo extus glabro, intus fauce inferiore et inter stamina villosa-barbato, lobis 2 mm. longis; filamentis brevissimis, antheris ellipsoideis, 1 mm. longis, dimidio superiore exsertis; disco fere 1 mm. longo; stylo \pm 4.5 mm. longo, exserto.

NETHERLANDS NEW GUINEA: Balim River, *Brass 11679* (TYPE), Dec., 1938, alt. 1600 m., muddy banks of stream (shrub 1 m. high; flowers white).

This species may be allied to *Psychotria Wernhamiana* S. Moore; from the original description of the latter it would seem as if the two are similar in habit. Moore's species has a bracteate inflorescence, whereas in *P. balimensis* the branches are subtended by little more than ciliate slightly protruding margins, the calyx is not dentate, and the corolla is villous in the lower part of the throat; further, the leaves are not striolate.

Psychotria multifurca Val. Bot. Jahrb. 61: 90. 1927.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12261, 12355*, Jan., 1939, alt. 1800 m. and 1650 m., open place in mossy forest, and open side of a ravine (shrub 1–1.5 m. high; leaf-margins crinkled; flowers white); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass 12800*, Feb., 1939, alt. 1200 m., rain-forest undergrowth (tree 3 m. high; leaf-margins crinkled).

These collections agree in large measure with the original description of Valeton's species. It is to be noted that Brass has recorded in each collection that the leaf-margins are crinkled, this is not a common character in the group under consideration, nor is it mentioned in the original description of this species; in the dried specimens it appears in varying degrees. The leaves are almost caudate-acuminate (acumen 1.5–2 cm. long) rather than shortly or moderately acuminate as indicated in Valeton's remarks, and the lateral nerves although distinctly manifest hardly project at all beyond the lower leaf-surface. The inflorescences seen are 12–15-flowered but scarcely multiflorous. Another collection apparently belonging to this alliance is *Brass 3990* from Dieni, Ononge Road, collected at 500 m. alt. from the rain-forest floor, a very small shrub with leaves 11–15 cm. long and 1.5–2.5 cm. broad, very thin in texture, at base and apex acute and acuminate.

Psychotria multicostoides Val. Bot. Jahrb. 61: 92. 1927, vel. aff.

BRITISH NEW GUINEA: Mafulu, *Brass 5304*, Oct., 1933, alt. 1250 m., in oak forest (small shrub; leaves smooth, dull; flowers white, perfumed; soft white fruit).

This collection, in practically all characters except those of the flowers and fruit, corresponds to the original description of *Psychotria multicos-*

toides Val. In his comment after the citation of specimens Valeton indicates that the material is not sufficiently complete for a good description. Whereas Valeton describes the calyx as cupular, obsoletely dentate or truncate, and the young fruit as pyriform crowned by the disk, in the Papuan collection the flowers are fairly large, the calyx is cupular, 1.5 mm. long, and varying from undulate to irregularly dentate; the corolla-tube is 5 mm. long and barbate in the upper half, with lobes 2 mm. long; anthers 1.5 mm. long, exerted; style and stigmas 5 mm. long; the fruit is more or less subglobose, 5 mm. long, 4 mm. diameter, and obviously crowned by the calyx, the pyrenes are slightly 2-costate and rugulose on the dorsal surface, and the albumen is ruminat.

Psychotria miniata sp. nov.

Arbor parva ad 5 m. alta, sparsim ramosa, glabra; ramis ultimis compressis, internodiis circiter 1 cm. longis; stipulis non visis, cicatricibus glabrescentibus; foliis obovato-ellipticis, 24–28 cm. longis, in tertio supero 9–11 cm. latis, deorsum sensim angustatis, basi elongato-cuneatis, apice subabrupte acuminatis, acumine circiter 1 cm. longo, chartaceis, utrinque glabris, nervis lateralibus utrinsecus \pm 21 utrinque prominulis, oblique adscendentibus vel patenti-adscendentibus prope marginem arcuatis, reticulo supra obscuro, subtus sub lente conferto; petiolo \pm 1 cm. longo, supra plano, subtus convexo; infructescentiis 5 cm. longis, prope basin ramosis; floribus non visis, probabiliter in apice ramulorum subfasciculatis; fructibus subglobosis, in sicco 1.3 cm. diametro, pyrenis 1 cm. longis, 7–8 mm. latis, ventre fere planis, dorso convexis, in tertio infero abrupte cuneato-angustatis et valde compressis, supero 3-costatis, costis acutis, apice leviter concavis, semine pyrenae conformi, albumine ruminato.

SOLOMON ISLANDS: Ysabel: Garona River, *Brass 3362* (TYPE), Dec., 1932, swampy lowland forests (small sparsely branched tree attaining 5 m. in height; leaves fleshy, grayish beneath; fruit smooth, scarlet, about 2 cm. diameter).

The distinguishing features of this species are the large leaves with relatively short petioles, the short infructescences with large fruits barely pedicellate, and the pyrenes with three acute ribs or narrow wings on the upper two-thirds of the dorsal surface.

Psychotria Kajewskii sp. nov.

Arbor circiter 15 m. alta; ramis ultimis glabris, compressis, internodiis vix 1 cm. longis (ramis visis tantum 10 cm. longis); stipulis non visis, cicatricibus novellis suberosis intus leviter pubescentibus; foliis oblongis, 14–22 cm. longis, 4.5–8 cm. latis, apice subabrupte acuminatis, acumine vix 1 cm. longo, basi anguste cuneatis, utrinque glabris, tenuiter chartaceis, nervis lateralibus utrinsecus 13–16, supra manifestis, subtus prominulis, patentibus, versus marginem arcuatis \pm confluentibus, reticulo supra inconspicuo subtus manifesto, sub lente conferto; petiolo 2–4.5 cm. longo; inflorescentiis glabris, plerumque e basi ramosis, 4–6 cm. longis, ramis verticillatis vel oppositis, brevibus, verticillis saepe 2; floribus 1–3 (in fructu 7) mm. pedicellatis; calyce et ovario 1.5 mm. longis, calyce brevissimo et undulato; corolla sub anthesin 2.2 cm. longa (intus glabra), lobis 3–4 mm. inclusis; antheris 2–3 mm. longis, probabiliter anthesis tempore exertis; filamentis antheris aequaliter longis; stylo 1.8 cm. longo; fructibus

globosis, \pm 1 cm. diametro; pyrenis 1 cm. longis, 7.5 mm. latis, ventre planis, dorso medio carinatis marginem versus convexis deinde compressis; albumine ruminato.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski 1652*, April, 1930, alt. 950 m., rain-forest; same locality, *Kajewski 1707* (TYPE), April, 1930, alt. 1000 m., rain-forest (small tree up to 15 m. tall; flowers white; fruit brown when ripe, globular, 1.1–1.2 cm. diameter).

Psychotria Kajewskii has several characters in common with the description of *P. aurea* Lauterb. The lateral veins of the leaves are, however, definitely spreading rather than ascending, the flowers are considerably larger, and the throat of the corolla is not barbate as in the latter species. In our species the calyx-tube is so short that at the apex of the fruit the disk is more prominent than the calyx.

Psychotria melanocarpa sp. nov.

Arbor 6–7 m. alta; ramulis ultimis glabris, nigrescentibus, internodiis 1–3 cm. longis; stipulis 1.5–2 cm. longis, \pm 1.2 cm. latis, basi connatis, bilobatis, lobis basi latis, apice circiter 3–4 mm. lineari-subulatis, extus \pm dense pubescentibus deinde glabrescentibus, subpersistentibus; foliis ellipticis vel oblongo-ellipticis, 7–20 \times 3–12 cm. etiam 10 \times 4 cm., 22 \times 9 cm., 24 \times 12.5 cm., apice vel abrupte acuminatis (acumine 7–10 mm. longo) vel sensim acuminatis (acumine circiter 1.5 cm. longo), basi rotundatis vel obtusis deinde cuneatis vel breviter decurrentibus, coriaceis, supra glabris, subtus consperse puberulis deinde glabratiss, costa nervisque \pm dense pubescentibus, nervis lateralibus utrinsecus 10–18 oblique patentibus deinde arcuatim adscendentibus, supra impressis, subtus prominentibus, venis subtus prominulis laxum reticulum formantibus, supra manifestis; petiolo 3–5.5 cm. longo, glabro; inflorescentiis immaturis 3 cm. longis, ramis et ramulis dense minute pubescentibus, verisimiliter non bracteatis; alabastris sessilibus vel subsessilibus in apice ramorum brevium, glabris; calyce et ovario 2.5 mm. longis, calycis limbo 1 mm. longo, minute dentato; corolla 2.5 mm. lobis 2 mm. inclusis longa (probabiliter maturitate longiore), fauce et loborum basi barbatis; infructescentiis 10–12 cm. longis, circiter 10 cm. latis, pedunculo vix 3 cm. longo, ramis verticillatis, verticillis 3 vel 4, fructibus subglobosis basi leviter angustatis, 1.2 cm. diametro, pyrenis levibus, dorso convexis, ventre planis, basi late cuneatis; albumine ruminato.

BRITISH NEW GUINEA: Palmer River, 2 miles below junction Black River, *Brass 7090* (TYPE), June, 1936, alt. 100 m., subseral forest on an old garden site in ridges (tree 6 m. tall; leaves stiff, prominently nerved; flowers white); Fly River, 528 mile Camp, *Brass 6735*, May, 1936, alt. 80 m., common in rain-forest second growths (small tree 6–7 m. tall; stiff branching habit; leaves pale, shining above; fruit subglobose, fleshy, black, \pm 1.2 cm. diameter).

It is difficult to suggest some species which might be considered as nearly related to this. In some features of the leaves, and also in the cupular almost truncate calyx, there is a little similarity with *Psychotria sentanensis* Val., but the former species seems to be amply distinct from the others described on the following combination of characters: prominent leaf-venation, sparsely reddish hairy along the main nerves; glabrous long petiole; ebracteate inflorescence with pubescent axis and branches; gla-

brous flowers with short cupular minutely dentate calyx; black shining fruit with smooth pyrenes.

Psychotria solomonensis sp. nov.

Arbor parva, usque 8 m. alta, inflorescentiis leviter puberulis exceptis glabra; ramulis ultimis teretibus, vel leviter compressis, levibus, internodiis superioribus 0.7–2.5 cm. longis; stipulis elliptico-oblongis \pm 1 cm. longis, apice late acutis, ad medium connatis, cito caducis; foliis oblongo-ellipticis vel leviter obovato-oblongis, 6–12 cm. longis, 1.5–4.5 cm. latis, apice subabrupte acuminatis, acumine 0.6–1.5 cm. longo, acutiusculo, basi angustatis acutis vel cuneatis, firme chartaceis, nervis lateralibus utrinsecus 8–12 utrinque prominulis, arcuatim adscendentibus, reticulo utrinque \pm manifesto, sub lente conferto; petiolo 1–2 cm. longo; inflorescentiis 2.5–4 cm. longis, e basi ramosis, minute puberulis, minute bracteatis; floribus in apice ramulorum breviter vel vix pedicellatis, glabris; calyce \pm 1 mm. longo, cupuliforme, minute 5-dentato; corollae tubo 3.5 mm. longo, fauce dense barbato, lobis 1.5 mm. vel vix 2 mm. longis; antheris 1 mm. longis, exsertis, filamentis 1 mm. longis; fructibus 7 mm. diametro, subpyriformibus; pyrenis dorso subrugosis et leviter 3-costatis, ventre planis; albumine ruminato.

SOLOMON ISLANDS: Ysabel: Tatamba, *Brass* 3419, Jan., 1933, alt. 50 m., hardwood forests (slender small tree with smooth green branches; leaves with recurved apex, lower surface of petiole and midrib brown; fruit smooth, shining brown); Malaita: Quoimonapu, *Kajewski* 2367 (TYPE), Dec., 1930, alt. sea level, rain-forest (small tree up to 8 m. tall; flowers white; fruit red when ripe, 7 mm. diameter); Guadalcanal: Uulolo, Mount Tutuve, *Kajewski* 2567, April, 1931, alt. 1200 m., rain-forest (small tree or large shrub-like tree up to 4 or 5 m. high; fruit brown-green when ripe, 1.2 cm. diameter); same locality, *Kajewski* 2609, alt. 1500 m., rain-forest (small tree up to 8 m.; fruit red when ripe, 1.8 cm. long, 1.6 cm. diameter); San Cristoval: Hinuahaoro, *Brass* 3063B, Sept., 1932, alt. 900 m., mountain rain-forests (small tree 2–3 m., underside of leaves gray-green; flower white; fruit green).

We have not seen the flowers of the last specimen cited above, but in general habit it seems to agree with the others. The species somewhat resembles *P. luconiensis* (Cham. & Schlecht.) F. Villar. It is readily distinguished from the latter by the closer reticulation of the leaves, the fewer lateral veins, the less definitely dentate calyx, and relatively much longer tube and shorter lobes of the corolla.

Psychotria hebecarpa sp. nov.

Arbor parva; ramulis ultimis dense patenti-pilosis, pilis crispulis, internodiis 0.7–1.5 cm. longis; stipulis 1–1.2 cm. longis, 3–4 mm. latis, dense patenti-pilosis, ad medium bifidis (lobis lineari-subulatis) mox caducis, cicatricibus annularibus intus dense pilosis; foliis oblongis, 3.5–10 cm. longis, 1.8–3.5 cm. latis, apice acutis, basi truncatis, chartaceis, supra glabris, subtus molliter pubescentibus, nervis lateralibus utrinsecus 8–13 supra manifestis, subtus subprominulis, subpatentibus, prope marginem \pm confluentibus; venis inconspicuis; petiolo 1–2.5 cm. longo, gracili, dense crispule patenti-piloso; inflorescentiis 1.5 (in fructu 2) cm. longis, breviter pedunculatis (pedunculo 0.6–1 cm. longo), totis dense patenti-pilosis vel subvillosis, bracteatis, bracteis subulatis, parvis; floribus ante anthesin tantum visis; calycis lobis 5, lanceolatis, 1 mm. longis; corolla 5 mm. longa, tubo leviter supra medium dense barbato, lobis 1.5 mm. longis; filamentis

1 mm. longis, antheris linearibus, 1 mm. longis; stylo glabro, 3 mm. longo. fructibus oblongis, calyce coronatis, in sicco leviter costatis, 5 mm. longis, 3 mm. diametro; pyrenis dorso leviter 3-costatis, albumine aequabile.

BRITISH NEW GUINEA: Aisa River, Central Division, *Brass 1419* (TYPE), May, 1926, in light pole forests (small tree; fruit white, succulent).

A species readily recognized by the contour of the leaves, the crisply hairy inflorescence, the oblong costate fruits, and the linear-subulate lobes of the stipules.

Psychotria tenuipes sp. nov.

Arbor usque 6 m. alta, glabra; ramulis ultimis teretibus, internodiis 1.5–2.5 cm. longis; stipulis gemmae evolutae deciduis in apice ramorum in vaginam longissimam (10–25 mm. longam) subteretem gemmam includentem connatis, apice 4-furcatis; foliis oblongo-lanceolatis, 5.5–11.5 cm. longis, 1.5–4 cm. latis, acutis vel acuminatis basi cuneatis, chartaceis, nervis lateralibus utrinsecus 8–13 utrinque prominulis, reticulo laxo utrinque manifesto; petiolo 1–1.4 cm. longo; inflorescentiis \pm 3 cm. longis, plerumque bis ramosis, paucifloris; pedunculo gracili, \pm 1.5 cm. longo; floribus circiter 5 vel 6, pedicellatis, pedicello 1.5–2 mm. longo; calyce cupulari tubo 1.5–2 mm. longo, lobis 1.5 mm. longis; corolla glabra, tubo 5 mm. longo, lobis 3 mm. longis; antheris 2 mm. longis; fructibus oblongis, circiter 1 cm. longis, 5 mm. latis, \pm obtuse 4-angulatis; calyce vix persistente; pyrenis 7 mm. longis, 4 mm. latis, dorso medio manifeste costato, costa lata et obtusa, ventre plano; albumine aequabile.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski 1708* (TYPE), April, 1930, alt. 1000 m., rain-forest (small tree up to 6 m. high; flower white; fruit brown when ripe, oblong ending in a sharp point, 1 cm. long, widest diameter 6 mm.).

Psychotria tenuipes is best recognized by the very slender inflorescence (sometimes axillary) and the oblong obtusely angled fruit. The type is fragmentary and more material is needed, but it looks like none of the other species which we have seen.

Psychotria tenuis sp. nov.

Arbuscula 3 m. alta, glabra; ramulis gracilibus, 4-angulatis, internodiis 0.5–2 cm. longis; stipulis 1 mm. longis in tubum vaginatum connatis, apice bidentatis, caducis; foliis 3–5 cm. longis, 0.6–1.4 cm. latis, anguste lanceolatis, apice attenuato-acuminatis vel caudatis, cauda \pm 1 cm. longa, angusta, obtusiuscula, basi cuneatis, chartaceis, nervis lateralibus utrinsecus circiter 5, supra obscuris, subtus vix manifestis; petiolo 3 vel 4 mm. longo, tenui; inflorescentiis 1–2 cm. longis, pedunculatis, pedunculo \pm 5 mm. longo, ramosis, ramis vix 5 mm. longis, bracteatis, paucifloris; bracteis minutis; calyce vix 1.5 mm. longo, minute 5-dentato; corollae tubo 5.5 mm. longo, tereti, basi leviter tumido, intus in dimidio supero patenti-pubescente vel barbato, lobis ovatis, 1.5 mm. longis; filamentis 1 mm. longis, antheris 1 mm. longis, apice tantum exsertis; disco 1 mm. longo, ultra calycem protuberante; stylo 4 mm. longo, stigmatibus 1 mm. longis; fructibus ovoideis, 7 mm. longis, 4 mm. diametro, circiter 8-costatis, costis obtusis; pyrenis dorso 3-costatis, sulcis inter costas rotundatis, ventre planis, albumine aequabile.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass 12983* (TYPE), Feb., 1939, alt. 1050 m., rain-forest undergrowth (tree 3 m. high; flowers white).

The habit of this species is very much like that of *Psychotria subcaudata* Val. but it is more slender in every way, the leaves are longer petioled and the apex is very much narrower, and also the flowers differ in the relative lengths of the corolla-tube and lobes.

Psychotria trichostoma sp. nov.

Arbor parva glabra; ramulis subteretibus, internodiis 1–5 cm. longis; stipulis lanceolatis, apice (in specimine typico) caudatis, caducis, cicatricibus non pubescentibus; foliis lanceolato-ellipticis vel ellipticis, 13–18 cm. longis, 5–7.5 cm. latis, apice breviter acuminatis, acumine 0.5–1 cm. longo, basi 5–7 mm. lato, basi elongatis et anguste cuneatis vel acutis, chartaceis, nervis lateralibus utrinsecus 8–10 utrinque prominulis, oblique patentiadscendentibus, venis subtus manifestis sed inconspicuis, reticulo sub lente conferto manifesto vel obscuro; petiolo 2–3 cm. longo; inflorescentiis breviter (5–10 mm.) pedunculatis, non bracteatis; ramis 5–7 circiter 1–2 cm. longis deinde cymoso-ramosis, ramulis ultimis 3–4 mm. longis; floribus in apice ramulorum subfasciculatis, pedicellatis, pedicellis circiter 1 mm. longis; calyce et ovario obconicis, calyce truncato \pm 1 mm. longo; corollae tubo 3 mm. longo, fauce dense barbato, lobis 2 mm. longis, ovatis; antheris 1.2 mm. longis partim exsertis; stylo 3 mm. longo; fructibus 8 mm. diametro, vix maturis, subgloboso-pyriformibus, leviter compressis; pyrenis dorso convexis, apice subtruncatis, latere infra medium subabrupte paulo latoribus, basi late cuneatis, ventre subplanis; albumine aequabile ventre sulcato.

SOLOMON ISLANDS: Florida (N'Gela): north end of the island, *Brass* 3515 (TYPE), Jan., 1933, coastal rain-forests (small tree with dull leaves, pale beneath; flower cream-colored; fruit smooth, green); Ysabel: Sigana, *Brass* 3529, Jan., 1933, rain-forest (small tree); Bougainville: Kieta, *Kajewski* 1611, Mar., 1930, alt. 100 m., rain-forest, near fresh-water creek (shrub up to 2 m. high; flower cream-green; fruit brown-green, 1 cm. long, 9 mm. diameter).

In Valetton's treatment of the genus *Psychotria* in Northeast New Guinea, under *P. Schmielei* Warb. he cites the collection *Warburg* 21454. We have at hand another specimen from the Bismarck Archipelago, *Warburg* 21453. Whether this is a duplicate or an isotype, we do not know, but apart from lacking fruit the specimen seems to agree well with the original description. Our species is very closely related to this one. The leaves are the same shape and the mode of inflorescence is comparable, but in Warburg's species the texture of the leaves is thinner, the branches and branchlets of the inflorescence are much less robust, perhaps one should say much more thread-like, the flower is smaller, and the corolla is glabrous in the throat; the fruit, according to the description, is 1-costate.

Psychotria trichostoma var. *macrophylla* var. nov.

A forma typica differt foliis majoribus, 29 cm. longis vel ultra, 13 (–19) cm. latis, inflorescentiis multifloris, floribus (in alabastris tantum visis) multo minoribus.

SOLOMON ISLANDS: Bougainville: Marmaromino, *Kajewski* 2203 (TYPE of var.), Sept., 1930, alt. 50 m., rain-forest (small tree up to 10 m. high; leaves large dark shiny green; flower-buds cream-colored; fruit red when ripe, 9 mm. long, 7 mm. diameter).

When further material has been collected this may prove to be a distinct

species; the specimens at hand, however, are too fragmentary to permit a final decision. The flower-buds are very much smaller than those on the type and much more crowded and profuse, but their structure is similar with indications of a very densely hairy corolla-throat. The pyrenes are essentially alike in outline but lack the slight broadening at the middle which characterizes those of the species. The leaves are very much larger, and in those which are little broken have 14 or 15 pairs of lateral nerves. The leaves on the fruiting specimen are very much broken and incomplete, but one is 19 cm. broad, and the lateral nerves (about 12 cm. above the base) are 2–3.5 cm. apart; the petiole varies from 2 to 5 cm. in length. In both flowering and fruiting specimens the peduncle is only 1 cm. long.

In addition to the above citations we have at hand another collection from Bougainville, *Kajewski 2001*, which has leaves, in size, intermediate between the species and the variety, but the fruit is orange-colored when ripe and when dry has a much thicker somewhat spongy exocarp. The pyrene closely resembles that of the species. Unfortunately we have no flowering material of this collection.

Psychotria sarcodes sp. nov.

Frutex ramosus 1.5 m. altus; ramulis ultimis compressis vel sulcatis, breviter patenti-pubescentibus, internodiis 1–5 cm. longis; stipulis brevibus, bilobis, extus rufo-pubescentibus, cito caducis, cicatricibus annularibus; foliis obovatis, 10–18 cm. longis, 4–6 cm. latis, tenuiter chartaceis, apice breviter acuminatis, basi elongatis anguste cuneatis vel acutis, supra glabris, subtus costa nervisque pubescentibus, nervis lateralibus utrinsecus 13–18 utrinque prominulis, oblique patentibus, venis vix manifestis, tenuibus; petiolo 1–1.5 cm. longo, supra glabro, plano, subtus pubescente, convexo; inflorescentiis circiter 2 cm. longis, e basi ramosis, minute puberulis, floribus glabris, 1 mm. pedicellatis; calyce vix 1 mm. longo, 5-dentato, dentibus caducis; corollae tubo 4 mm. longo, fauce ampliato, dense villosa-barbato; lobis 2 mm. longis; staminibus 5, sub dimidio corollae tubi insertis; stylo 4 mm. longo; stigmata bilobata, lobis planis; fructibus late ellipticis, in sicco 1 cm. longis, 9 mm. latis, compressis; pyrenis paulo minoribus, ventre planis, dorso complanatis sed ab apice ad medium carinatis, carina inclusa 3 mm. crassis; albumine aequabile.

SOLOMON ISLANDS: San Cristoval: Waimasi, *Brass 2782* (TYPE), Aug., 1932, alt. 100 m., rain-forests, common (bushy shrub 1.5 m. tall; leaves rather fleshy, petioles purple; flower white); Ulawa: *Brass 2954*, Oct., 1932, alt. 100 m., rain-forests (shrub 1.5 m. tall; flower white; fruit red, soft and fleshy, about 2 cm. diameter).

The distinctive characters of this species are the obovate leaves with elongated narrow base, the short inflorescences, and the flattened pyrenes with the sharp thin keel on the upper half.

Psychotria leiophylla sp. nov.

Arbor parva gracilis glabra, vel frutex magnus; ramis ultimis gracilibus compressis, internodiis 1–4 cm. longis; stipulis membranaceis intus dense pubescentibus, cito caducis, parvis, \pm 2 mm. longis, acutiusculis, \pm annularibus; cicatricibus saepe dense pubescentibus; foliis elliptico-lanceolatis vel lanceolatis, in specimine typico 11.5–18 cm. longis, 4.5–7 cm. latis, in ceteris 9.5–14 \times 3.5–7 cm. etiam 12–16 \times 3–4.5 cm., apice et

basi acutis vel leviter acuminatis, tenuiter chartaceis fere membranaceis, nervis lateralibus utrinsecus 8–10 utrinque subprominulis, oblique patentibus versus marginem arcuatim adscendentibus, reticulo laxo inconspicuo; petiolo 1–2.5 cm. longo, gracili; inflorescentiis 3–5 cm. longis latisque, cymoso-paniculatis; pedunculo 1–2 cm. longo; bracteis lineari-lanceolatis, inconspicuis; floribus in apice ramorum brevium subfasciculatis pedicellatis, pedicellis 1 mm. longis; calyce 0.5 mm. longo, dentato; corollae tubo 4 mm. longo, intus fauce densissime barbato, lobis 1.5 mm. longis, basi barbatis; antheris linearibus vix 1.5 mm. longis magna ex parte exsertis, filamentis brevissimis; stylo 5 mm. longo in parte superiore puberulo; fructibus late ovoideo-ellipsoideis, basi fere truncatis, apice late rotundatis calyce coronatis, 4–5 mm. longis, basi 4–5 mm., apice 3–4 mm. latis, 3 mm. crassis; pyrenis dorso subrotundatis, ventre bisulcatis; albumine aequabile.

SOLOMON ISLANDS: San Cristoval: Huro River, *Brass 3908*, Oct., 1932, riverine rain-forest (small slender tree; under surface of leaves very pale green; flowers pale yellow); Star Harbor, *Brass 3133* (TYPE), Oct., 1932, coastal rain-forest (large shrub); Owa Raha (Santa Anna, southeast of San Cristoval), *Brass 3986*, Oct., 1932, alt. 100 m., rain-forest (small tree with very smooth and somewhat fleshy leaves).

A rather striking looking collection with very thin leaves, relatively short inflorescence, small flowers with the throat densely hairy, a character drawing instant attention to an open flower, unusual shaped fruit slightly broader at the base than at the apex, and lastly the sharp rib in the ventral surface of the pyrene emphasized on either side by a narrow sinus.

Psychotria waimamurensis sp. nov.

Frutex 1.5–2 m. altus; ramulis fusco-puberulis, internodiis 1.5–3 cm. longis; stipulis non visis, cicatricibus pubescentibus; foliis lanceolatis vel elliptico-lanceolatis, 11–19 cm. longis, 3.5–6 cm. latis, utrinque sensim angustatis, apice acuminatis acumine acuto vel obtusiusculo, basi anguste cuneatis, chartaceis, supra glabris, subtus costa nervisque inconspicue puberulis, nervis lateralibus utrinsecus \pm 14 oblique patentibus, supra manifestis, subtus prominulis, venis inconspicuis, reticulo laxissimo vix manifesto; petiolo 7–10 mm. longo, supra plano; inflorescentiis terminalibus, sessilibus, compactis, bracteatis; bracteis circiter 4, parvis, \pm 2 mm. longis, subrotundatis, extus minute pubescentibus; floribus non visis; fructibus \pm 12, breviter pedicellatis; pedicellis circiter 2 mm. longis, glabris; fructibus in sicco pyriformibus, costatis 12 mm. longis, 6 mm. diametro, glabris; pyrenis 10 mm. longis, 5 mm. latis, ventre planis, dorso convexis, medio alatiformi-costatis, interdum etiam costis 2 minoribus; albumine aequabile.

SOLOMON ISLANDS: San Cristoval: Waimamura, *Brass 3203* (TYPE), rain-forests; common (shrub 1.5–2 m. high; fruit red, fleshy).

This species suggests *Psychotria capitulifera* Merr. & Perry, but the leaves are more narrowed at both ends, the inflorescence is sessile, and the bracts subtending it are very much smaller than in the species from Ysabel Island.

Psychotria capitulifera sp. nov.

Arbor parva; ramulis ultimis subteretibus vel compressis et obtuse angulatis, pubescentibus, pilis patentibus, circiter 0.5 mm. longis, rubiginosis; stipulis \pm 17 mm. longis, fere ad medium bifidis, parte inferiore

utrinque pubescentibus, lobis lineari-lanceolatis, cicatricibus pubescentibus; foliis ellipticis vel obovato-ellipticis vel novellis oblongis, 9–20 cm. longis, 3–8.5 cm. latis, apice acutis vel breviter acuminatis, basi obtusis vel anguste rotundatis, chartaceis, supra glabris, subtus inter nervos sparsim nervis dense patenti-pubescentibus, nervis lateralibus utrinsecus 8–14, oblique adscendentibus, utrinque prominulis, venis supra obscuris, subtus inconspicuis, subparallelis, subtransversis vel obliquis; petiolo 0.5–1 cm. longo, dense patenti-pubescente; inflorescentia solitaria terminali erecta probabiliter globosa densiflora pedunculata, in sicco circiter 2 cm. diametro, involucrato, bracteis involucralibus \pm 1 cm. longis, pedunculo 2 cm. longo, glabro; floribus dense confertis; pedicellis 2 mm. longis; calyce campanulato, tertio supero lobato, lobis circiter 1 mm. longis, inaequalibus, longe ciliatis ceterum glabris; corollae tubo 5–6 mm. longo, fauce dense barbato, lobis 5, 2.5–3 mm. longis, oblongo-lanceolatis, extus interdum pubescentibus, intus glabris; antheris paulo infra medium tubum insertis; disco plano, circiter 0.5 mm. longo, 1.5 mm. lato; stylo 5 mm. longo, glabro; stigmatibus planis, membranaceis, minute papillosis, patentibus.

SOLOMON ISLANDS: Ysabel: Tasia, *Brass* 3277 (TYPE), Dec., 1932, common in lowland rain-forests (small tree; lower surface, midrib and main nerves pink; flowers and bracts pink).

Psychotria capitulifera is readily separated from the other species of the genus at hand from the Papuan region by the pedunculate head of flowers surrounded by an involucre. The individual flowers, however, as far as we can see without mutilating the head too much, are not subtended by bracteoles, but at the base of the short pedicel there are occasionally a few hairs. The calyx-lobes are ciliate with long fairly crowded hairs; the mouth of the corolla-tube is crowded with hairs protruding from the throat; the stamens are below the hairy region of the throat; and the stigmas are very thin, flattened and spreading above the barbate throat. The young branchlets and the under surface of the leaves are pubescent with short spreading hairs. The structure of the throat and the position of the stamens suggest a dimorphic flower, but further material is necessary before making any positive statement on this character.

Calycosia A. Gray

Calycosia Kajewskii sp. nov.

Planta usque ad 2 m. alta, glabra; ramulis internodio supero 1 cm. longo excepto non visis; stipulis magnis, 8 vel 9 cm. longis, in sicco irregulariter plicatulis, margine supero consperse dentato, dentibus apice callosis; foliis magnis, obovatis, \pm 50 cm. longis, in tertio supero 12–15 cm. latis deorsum sensim attenuatis, basi acutis, apice acuminatis, acumine circiter 2 cm. longo, nervis lateralibus utrinsecus \pm 45 adscendentibus, utrinque prominentibus, venis inter nervos subregulariter transversis, inconspicuis; petiolo \pm 10 cm. longo, supra valde canaliculato; inflorescentiis subterminalibus; capitulo circiter 5 cm. lato, 4 cm. longo, bracteato; bracteis exterioribus ellipticis, obtusis, vix 4 cm. longis, pluribus; floribus inter bracteolas dispositis; bracteolis inaequaliter magnis, lanceolato-ellipticis, apice obtusis, basi intus glandulas elongatas suffultis; pedicellis 4 mm. longis; calyce tubulato, 6 mm. longo, undulate 5-lobato, glabro; corollae tubo 1.5 cm. longo, extus glabro, intus sub staminibus annulo-puberulo, lobis 5, circiter

3 mm. longis; antheris linearibus 2.5 mm. longis, inclusis, in fauce insertis; stylo gracili; stigmatibus exsertis; fructibus non visis.

SOLOMON ISLANDS: Bougainville: Kupei Gold Field, *Kajewski* 1693 (TYPE), April, 1930, alt. 1000 m., on creek bank in rain forest (plant up to 2 m. high, with large green leaves and liking wet places; petals white, pistil transparent, almost water color, anthers white).

For the time being we have placed this collection in the genus *Calycosia*, since it has a fairly long tubular calyx, flowers in a capitate inflorescence surrounded by submembranous bracts, and large leaves. Although the general habit of the specimen is like that of *Calycosia*, the stipules are exceedingly large, also so folded and wrinkled that it is hard to say exactly what is their size and shape. The capitate inflorescence and the new vegetative bud apparently are between the two terminal leaves, one centimeter below this node and enclosing it are two stipules belonging to the node below. The bracts and bracteoles of the inflorescence are numerous and the bracteoles vary in size possibly with the age of the flower which they subtend, but all are similar in outline. We removed only a small part of the head for examination, and some flowers are already past anthesis and the corolla has fallen, while others are very young, the corolla-lobes protruding about 1 mm. above the margin of the calyx. The genus has not previously been recorded from the Solomon Islands.

Cephaelis Swartz

Cephaelis Kajewskii sp. nov.

Arbor parva usque ad 6 m. alta; ramulis minute patenti-pubescentibus, demum glabratis, internodiis 2-4 cm. longis; stipulis in gemma terminali tantum visis, apice fractis, extus rufo-pubescentibus, caducis; foliis oblongo-lanceolatis vel oblongo-ellipticis, 10-14 cm. longis, 3-5.5 cm. latis, apice breviter et obtuse acuminatis, basi anguste cuneatis, supra glabris, subtus novellis \pm dense, maturis consperse (costa dense) pubescentibus, nervis lateralibus utrinsecus \pm 9 oblique patenti-arcuatis utrinque prominulis marginem versus gracillimis, venis costalibus intermixtis, tenuibus; petiolo 1-1.5 cm. longo, pubescente; inflorescentiis terminalibus vel axillaribus, sessilibus, capitulo circiter 3 cm. diametro, novellis 1.3 cm. longis, 7 mm. diametro; bracteis usque ad 3 cm. longis, extus \pm pubescentibus, ciliolatis; bracteolis usque ad 1 cm. longis, late rotundatis vel ovatis, membranaceis, glabris, ciliolatis; floribus \pm 1 mm. pedicellatis; calycis tubo circiter 2 mm. longo, glabro, lobis 1 mm. longis, ovatis, ciliatis; corollae tubo 4.5 mm. longo, extus glabro, fauce dense villosulo, lobis 2 mm. longis; antheris vix 1.5 mm. longis, sub fauce villosula positis; stylo 4.5 mm. longo, stigmatibus leviter exsertis; fructibus subglobosis, \pm 1 cm. diametro, calyce coronatis; pyrenis subrotundatis, 7 mm. longis latisque, dorso 3-costatis, costis alati-formibus deorsum angustatis, basi obscuris.

SOLOMON ISLANDS: Malaita: Quoi-mon-apu, *Kajewski* 2333 (TYPE), Dec., 1930, sea level (small tree up to 6 m. high; fruit shiny red when ripe, 1.2 cm. diameter, with a small tubular protuberance at the end, pulp of fruit pink).

This species seems readily distinguishable from the other species of the genus reported from Papuasias by its smaller leaves, heads and flowers. We have not located any previous reports of the genus from the Solomon Islands.

Lasianthus Jack

Lasianthus cyanocarpoides Val. Bot. Jahrb. 61: 108. 1927.

NORTHEAST NEW GUINEA: Upper Ramu, *Clemens 10741*, Aug.-Dec., 1939. BRITISH NEW GUINEA: Dieni, Ononge Road, *Brass 3983*, May, 1933, alt. 500 m., rain-forest (one of several closely related plants common as rain-forest bushes). Previously known from Northeast New Guinea.

Lasianthus cyanocarpus Jack, var. *novaguineensis* Val. Nova Guin. Bot. 8: 498. 1911.

BRITISH NEW GUINEA: Fly River, 528 mile Camp, *Brass 6850*, May, 1936, alt. 80 m., uncommon in ridge forest undergrowth (shrub 2 m. tall). Described from Netherlands New Guinea, previously known only from the type collection.

Lasianthus chlorocarpus K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Süds. Nachtr. 399. 1905; Val. Bot. Jahrb. 61: 109. 1927.

NETHERLANDS NEW GUINEA: Mamberamo, near Prauwenbivak, *Lam 793, 1217*, Aug., Sept., 1920, alt. 100, 150 m.; Nabire, Geelvink Bay, *Kanehira & Hatusima 11632*, Feb., 1940, alt. 50 m., in tall rain-forest. BRITISH NEW GUINEA: Koitaki, *Carr 12648*; Bisiatabu, *Brass 585*, Nov. 1925, alt. 450 m.; Dieni, Ononge Road, *Brass 3982*, May, 1933, alt. 500 m. SOLOMON ISLANDS: Guadalcanal: Uulolo, Tutuve Mt., *Kajewski 2612*, May, 1931, alt. 1200 m. (shrub 1-2 m. tall; fruit blue, 8 mm. long, 6 mm. diameter, white flesh, black seeds).

Most of these collections are in fruit, very few flowers being available for comparison, and hence we are unable to tell whether this is conspecific with the Queensland material of *L. strigosus* Wight or not. The latter species is not represented in our herbarium from Ceylon, the type-region.

Lasianthus sylvestroides Val. Bot. Jahrb. 61: 109. 1927.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass 12811, 13025*, Feb., Mar., 1939, alt. 1200 and 1250 m., rain-forest undergrowth (slender near-tree 1.5 m. high; flower-buds conspicuously white hairy; fruit soft, yellow; and in *13025* fruit white).

These specimens so closely fit the description of Valetton's species that we are adding a brief diagnosis of the flower-bud, since, although he mentions the flowers, he says nothing about them except what might be drawn by inference from a fruiting specimen. The leaves in our two specimens are 8.5-14 cm. long, 2-4.5 cm. broad; in the younger specimen between the horizontal parallel veins there is an inconspicuous reticulation which is lacking in the older more coriaceous leaves. The flower-buds are up to 13 mm. long, none of them yet open. Ovary 2 mm. long; calyx-lobes 6, linear-lanceolate, subulate, 3 mm. long, tube about 1 mm.; corolla 10 mm. long, outside particularly above the calyx densely spreading hirsute, within the lower 4 mm. of the tube is glabrous, then the tube begins to be pubescent and here are the 2 mm. long anthers (6), it is difficult to say where the lobes begin as the inside of the lobes is also densely pubescent; the style is 7 mm. long, glabrous, and topped by the 1 mm. long stigmatic lobes.

Lasianthus papuanus Wernham, Trans. Linn. Soc. II. Bot. 9: 78. 1916; Val. Bot. Jahrb. 61: 106. 1927.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13639*, March, 1939, alt. 850 m., rain-forest; occasional in the undergrowth of gullies (fruit blue).

Our plant does not wholly fit this description; the base of the leaves is

cuneate, not subrounded, the upper surface of the leaves is glabrous, there are several flowers in an inflorescence rather than one or two, and the calyx-lobes on the fruit are only 1 mm. long. The buds are too young to disclose anything about the floral characters.

Saprosma Blume

Saprosma subrepandum (Lauterb. & K. Schum.) Val. Nova Guin. Bot. 8: 500. 1911, Bot. Jahrb. 61: 118. 1927.

Psychotria (?) *subrepanda* Lauterb. & K. Schum. Fl. Deutsch. Schutzgeb. Süds. 579. 1900.

NETHERLANDS NEW GUINEA: Nabire, Geelvink Bay, *Kanehira & Hatusima* 11559, Feb., 1940, in tall rain-forest (plant 1 m. tall; fruit blue). BRITISH NEW GUINEA: Palmer River, 2 miles below junction Black River, *Brass* 7178, July, 1936, alt. 100 m., forest undergrowth on crests of high ridges (shrub 80–100 cm. high; fruit blue, \pm 1 cm. long); Dieni, Ononge Road, *Brass* 3996, May, 1933, alt. 500 m., rain-forest understorey (slender bush or tree 2 m. tall; very thin dull leaves darker above; fleshy pale blue ovoid fruit \pm 1 cm. long, 7 mm. diameter); Koitaki, *Carr* 12543, June, 1935, alt. 450 m., forest (shrub little over 1 m. tall; flowers white). SOLOMON ISLANDS: San Cristoval: Magoha River, *Brass* 2733, Aug., 1932, alt. 150 m., rare; steep side of rain-forest ravine (much branched little shrub 50 cm. high; leaves wrinkled, very pale beneath).

These collections seem to have the characteristic stipular glands of the genus *Saprosma*. The species has been reported previously from Netherlands New Guinea and Northeast New Guinea. Several of the fruits cut transversely showed only one seed which would normally be called a pyrene, but one showed two locules and here the crustaceous thickening of the endocarp did not extend over the ventral wall of the seed as one would expect in the case of two pyrenes. More material is desirable.

Saprosma Brassii sp. nov.

Frutex circiter 2 m. altus; ramulis teretibus, novellis compressis vel leviter sulcatis, rufo-pubescentibus, pilis crispis; stipulis non visis vel fractis; foliis 13–16 cm. longis, 5.5–6.5 cm. latis, elongato-ovatis, apice obtuse acuminatis, basi rotundato-cuneatis vel obtuse cuneatis, supra glabris, subtus consperse costa nervisque \pm dense pubescentibus, pilis brevibus et crispis, nervis lateralibus utrinsecus 12 vel 13 distincte manifestis, subtus prominulis, oblique patentibus prope marginem arcuatim confluentibus, venis costalibus intermixtis, versus marginem reticulo laxo praesertim subtus distincte manifesto; petiolo 1.5–2.2 cm. longo, rufo-pubescente; inflorescentiis axillaribus, sessilibus, bracteatis, bracteis fractis; floribus confertis, probabiliter subsessilibus, bracteolatis; bracteolis \pm oblongis, 2–4 mm. longis, 1 mm. latis, extus sparsim, marginem versus dense pilosulis et margine 3–5-glandulosis, pilis glandulosis circiter 0.5 mm. longis; calycis tubo circiter 1 mm. longo, lobis 1.5–2 mm. longis, lanceolato-oblongis, extus pubescentibus, ciliatis; corolla in alabastro tantum visa, tubo extus glabro, 2 mm. longo, intus dimidio supero dense villosulo, lobis 1.5 mm. longis, extus sparsim pubescentibus; antheris in fauce insertis, 1.5 mm. longis; stylo glabro, stigmatibus lineari-oblongis; fructibus non visis.

SOLOMON ISLANDS: Florida (N'Gela or Tulagi): *Brass* 3519 (TYPE), Jan., 1933, alt. up to 20 m., rain-forest slopes (compact shrub about 2 m. tall; leaves deeply wrinkled, upper side very dark and shining; flowers pink).

This is not closely comparable with any other species of *Saprosma* which we have seen. In the first place the dried plant is reddish brown rather than olive-brown as in the other species. The shape of the leaves is somewhat similar to that of the leaves of *S. pubescens* Ridl. but the venation is more crowded than in the latter, also the inflorescence is axillary in the Solomon Islands material, sessile and many-flowered, whereas in Ridley's species it is terminal with about 5 flowers.

Amaracarpus Blume

The genus *Amaracarpus* as here treated roughly includes three groups: (1) plants with large leaves and for the most part with almost filiform pedunculate axillary inflorescences; (2) plants generally pubescent with rather thick hairs on young shoots and with a very distinctive habit marked by horizontally placed small leaves and branches, flowers solitary and sessile or very short pedicellate, usually subtended by reduced leaves and stipules or stipule-like bracts; (3) glabrous plants with more irregular branching, often crowded leaves, rounded-oblong or ovate stipules, flowers larger than in either of the other groups, mostly with a granular-puberulent throat and relatively long filaments. It should be noted that none of these groups are exclusive in their characters. The first two usually have similar stipules, i. e. more or less connate into a tube and each terminated by two setae very often separated by a rounded sinus; on the lower surface along the midrib of the leaf is a spreading pubescence of very short hairs. The last group is least like the others, and it is this group which we should have liked to have placed in *Dolianthus* C. H. Wright, but we could not make our plants fit either the description of Wright or the emended one of Bremekamp. There are six species in this aggregate, *A. bicolor*, *A. caeruleus*, *A. buxifolius* (C. H. Wright), *A. Clemensae*, and *A. Archboldianus*, and one of these, *A. Clemensae*, has the pubescence characteristic of *Dolianthus* and a large number of species of *Amaracarpus*, but Wright does not mention any bracts on the inflorescence and Bremekamp clearly specifies that the flower is ebracteolate. In the material of *A. Clemensae* the bracts are conspicuously longer than the calyx. Only one species of this group is without subtending floral bracts and that is *A. Archboldianus*. Whatever may be the ultimate disposition of these species, it seems best at present to point out these differences and leave them here until such time as more material and types are available. It might be added that these species do not have the regular branching of *Amaracarpus* in the narrower sense, but it is also to be noted that in Valetton's key he indicates that not all species show clearly the dorsiventral branching.

Amaracarpus urophyllus sp. nov.

Frutex 1.5–2 m. altus; ramulis lineis decurrentibus pubescentibus a basi stipulorum exceptis glabris, internodiis 2–4 cm. longis, superioribus compressis; stipulis 1.5–2 cm. longis, basim versus et margine pubescentibus, apice setulosis (setis circiter 1.5 mm. longis), caducis, cicatricibus pubescentibus; foliis 7–14 cm. longis, 1.8–4 cm. latis, lanceolato-ellipticis vel lanceolato-oblongis, utrinque angustatis deinde apice longe et anguste caudato-acuminatis, basi cuneatis, supra glabris, novellis subtus costa

nervisque patenti-puberulis ceterum glabris, nervis lateralibus utrinsecus 10–12 in sicco utrinque prominulis, venis costalibus intermixtis, reticulo laxo utrinque manifesto; petiolo 5–7 mm. longo, glabro, supra canaliculato; inflorescentiis longe pedunculatis, axillaribus; pedunculo 3–5 cm. longo, gracillimo, glabro, apice 1–3-floro, bracteato; bracteis \pm 5 mm. longis; floribus sessilibus, glabris, vix maturis, bracteolatis; bracteolis minimis; calycis tubo 2 mm. longo, lobis 1.5 mm. longis, obtusiusculis; corollae tubo 6 mm. longo, intus glabro, lobis 2.5 mm. longis, antheris 3 mm. longis, partim exsertis; stylo 4 mm. longo, stigmatibus 1.5 mm. longis; fructibus oblongis, basi angustatis, 11.5 mm. longis (calyce incluso), vix 5 mm. diametro; pyrenis dorso rotundatis, ventre subplanis.

BRITISH NEW GUINEA: Mount Tafa, *Brass 4998* (TYPE), Sept., 1933, alt. 2400 m., common in undergrowth of valley forest (bush 1.5–2 m. high; branches short and flat-spreading; leaves dark and smooth, midrib whitish underneath; flowers white; fruit smooth, green).

This species suggests *A. longifolius* Val. in general aspect, but the branchlets are pubescent only on two lines decurrent from the base of the stipules, the leaves are more abruptly and much more narrowly caudate-acuminate, the corolla is glabrous within the throat, the stamens have very short filaments, the stigmas are oblong and inconspicuously papillate, and the inflorescence at the insertion of the peduncle seems to be surrounded only by hairs.

***Amaracarpus attenuatus* sp. nov.**

Frutex arborescens; ramulis plerumque glabris, internodiis 2–7 cm. longis, compressis interdum leviter sulcatis; stipulis in alabastris tantum visis, in latere uno fissis, caducis, cicatricibus intus dense pubescentibus; foliis ovato-lanceolatis vel lanceolatis, 8–15.5 cm. longis, 2.5–5 cm. latis, apice longe acuminatis, acumine 1.5–2.5 cm. longo, acuto, basi cuneatis, chartaceis, supra glabris, subtus costa nervisque patenti-pubescentibus, nervis lateralibus utrinsecus 9–11 supra impressis, subtus prominulis venis costalibus intermixtis, reticulo supra vix manifesto, subtus sub lente distincto, laxo; petiolo 6–10 mm. longo, glabro, supra canaliculato, dorso rotundato; inflorescentiis axillaribus paucifloris, gracillimis, 5–11 cm. longis, pedunculatis, pedunculo pubescente, 3.5–7 cm. longo, cymosoramosis, ramulis basi bracteatis, plerumque glabris, bracteis circiter 6 mm. longis lineari-filiformibus; floribus subsessilibus, basi bracteolatis, bracteolis minutis, circiter 0.5 mm. longis; calyce 1 mm. longo, 4-lobato, lobis latis obtusiusculis, sinibus latis concavis; corollae tubo 1.5 mm. longo, fauce \pm dense pilosulo, lobis 2 mm. longis; filamentis in fauce insertis, 1.5 mm. longis, antheris 1 mm. longis exsertis; stylo 1 mm. longo, stigmatibus 0.5 mm. longis, latiusculis; fructibus oblongis, 6 mm. longis, pyrenis in sicco dorso leviter 1–2-costatis, inter facies ventrales prope medias \pm spongiosis, ventre \pm costatis.

BRITISH NEW GUINEA: Oroville Camp, Fly River, *Brass 7419* (TYPE), Aug., 1936, in riverbank undergrowth (arborescent shrub; flowers white; fruit soft, red, 6–7 mm. diameter).

According to the description and the plate, this plant seems to be allied with *Amaracarpus heteropus* Val. It differs in the following characters: (1) it is not so characteristically short-branched; (2) the stipules are

glabrous except toward the apex and they do not terminate in the setae characteristic of *A. heteropus* Val., they apparently split down one side and fall off as the bud expands; (3) the leaves are longer-acuminate; (4) the inflorescence is definitely long-pedunculate, and usually branched twice, the two lower branches are mostly terminated by a single flower, the rachis terminating in a single flower or branched again and bearing three flowers; (5) the flowers are about half as large as in Valetton's species.

Amaracarpus brachypus sp. nov.

Arbuscula 2 m. alta; ramulis glabris, internodiis 2-5 cm. longis; stipulis cito caducis, forsitan in una gemma visis, 3 mm. longis, minute pubescentibus; foliis 5.7-13.5 cm. longis, 2-4 cm. latis, valde chartaceis vel tenuiter coriaceis, glabris, elliptico-lanceolatis utrinque angustatis, apice attenuatis obtusis vel leviter acuminatis, basi cuneatis, in sicco margine integris vel subrepandis, nervis lateralibus utrinsecus 8-12 patentibus prope marginem arcuatim confluentibus, utrinque prominulis, venis costalibus inter nervos dispositis, reticulo satis laxo utrinque inconspicuo; petiolo circiter 5 mm. longo; floribus non visis; fructibus solitariis vel in triadibus in apice ramulorum brevium axillorum sessilibus, basi bracteis foliiformibus \pm 6 mm. longis vel foliis valde diminutis (usque ad 3 cm. longis) suffultis, pyriformibus, \pm 8 mm. longis, circiter 5 mm. diametro, in sicco leviter costatis et granulati-rugulosis, apice calyce coronatis (calycis lobis 2 mm. longis, lineari-oblongis, tubo 0.5 mm. longo); pyrenis dorso convexis undulatis, ventre costa media instructis.

BRITISH NEW GUINEA: Dieni, Ononge Road, *Brass* 3876 (TYPE), April, 1933, alt. 500 m., rain-forest understorey (very small tree 2 m. tall; dark shining leaves; yellow-brown smooth slightly urceolate fruit \pm 8 mm. long, 7 mm. diameter).

The habit of this plant is very much like that of *Amaracarpus grandifolius* Val. but the latter is pubescent, the petiole is shorter, and the calyxlobes are shorter than the tube and relatively broad like a toothed margin rather than a lobed one.

Amaracarpus solomonensis sp. nov.

Arbor gracilis usque ad 7 m. alta; ramulis glabris, internodiis 2.5-5 cm. longis, superioribus compressis; stipulis \pm 2 cm. longis, lineari-oblongis, \pm pilosis, caducis, in gemmis terminalibus tantum visis; foliis 10-15 cm. longis, 3.5-5.5 cm. latis, tenuiter chartaceis, late lanceolatis vel anguste elliptico-lanceolatis utrinque angustatis, apice attenuatis acuminatis, summo apice obtusiusculis, basi cuneatis, utrinque glabris, nervis lateralibus utrinsecus \pm 10 utrinque subprominulis, patentibus et marginem prope arcuatim confluentibus, reticulo laxo supra obscuro vel utrinque manifesto; petiolo \pm 6 mm. longo, glabro, supra plano; inflorescentiis axillaribus, fasciculatis, brevissime pedunculatis (1-1.5 mm. longis); floribus 1-12 in fasciculo subsessilibus, bracteatis; bracteis membranaceis, glabris; calycis tubo 1.5 mm. longo, lobis vix 1 mm. longis, consperse pilosulis; corollae tubo 4 mm. longo, villosulo, lobis lineari-oblongis, 4 mm. longis; antheris partim exsertis; stylo 8 mm. longo; stigmatibus valde exsertis; fructibus circiter 8 mm. longis (calyce incluso), 4 mm. diametro, levibus; pyrenis dorso convexis, pariete dorsali tenui, ventrali lacunoso.

SOLOMON ISLANDS: Bougainville: Kieta, *Kajewski* 1541, March, 1930, alt. 15 m., rain-forest creek (plant up to 1.5 m. tall; fruit red when ripe, fleshy);

Guadalcanal: Berande River, *Kajewski* 2394, Dec., 1930, sea level, rain-forest (small tree about 7 m. high; petals cream-colored; fruit red-green when ripe, length including calyx 1 cm., diameter 6 mm.); Ulawa: *Brass* 2955 (TYPE), Oct., 1932, alt. 200–300 m., upland rain-forests (slender tree 5 m. tall, with a few short thin spreading branches at the summit; flowers white).

Amaracarpus solomonensis is probably related to *A. brachypus* Merr. & Perry. Both are glabrous plants with large leaves and short petioles. In the latter the fruit appears to be on short axillary shoots and subtended by leaf-like bracts; in the former the flowers seem to be axillary and subtended by membranaceous bracts. Further material of both species is desirable.

Amaracarpus subcaudatus sp. nov.

Arbuscula 3–4 m. alta; ramulis glabris, internodiis ultimis compressis, 5–10 mm. longis; stipulis vix 5 mm. longis, apice bifidis vel lineari-setulosis, setulis pubescentibus; foliis 3.5–6 cm. longis, 1–2.3 cm. latis, lanceolatis vel ellipticis, chartaceis, utrinque angustatis, apice late acuminatis, subcaudatis, basi cuneatis, supra glabris, subtus costa tantum minute patentipuberula, nervis lateralibus utrinsecus 8–10 valde patentibus prope marginem arcuatim confluentibus, utrinque distincte manifestis, venis costalibus sub lente intermixtis, reticulo conferto indistincto; petiolo 2.5–5 mm. longo, glabro, gracili; inflorescentiis axillaribus, bracteatis, sessilibus; floribus 1–3 in fasciculo, glabris; calyce circiter 1 mm. longo minute 4–5-dentato, margine minute ciliolato; corollae tubo 1.5 mm. longo latoque, fauce sparsim barbato, lobis 1.5 mm. longis; fructibus leviter obovoideis, 6 mm. longis, 4 mm. diametro; pyrenis dorso convexis, ventre planis, minute irregulariter rugulosis.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12761 (TYPE), 12801, Feb., 1939, alt. 1200 m., frequent in rain-forest undergrowth and common on crests of ridges (tree 3–4 m. high; flowers white; fruit red and fleshy).

The size and shape of the leaves of this species suggest *A. Nouhuysii* (Val.) Val. but the latter has a pedunculate inflorescence.

Amaracarpus calcicola sp. nov.

Frutex \pm 1 m. altus; ramulis maturis glabratis, cinerascentibus, novellis crispe rufo-pubescentibus, internodiis 1–2 cm. longis, ramulis ultimis valde diminutis ut videtur in axillis foliis aggregatis vel longioribus et axi stipulis subpersistentibus tecto; stipulis novellis puberulis cito glabratis, circiter 2–2.5 mm. longis, subovatis, apice bi-setulosis, subpersistentibus; foliis 1–2.5 cm. longis, 0.5–1 cm. latis, in ambitu valde variabilibus, oblanceolatis vel ellipticis, apice rotundato-obtusis vel acutiusculis, basi angustatis acutis, glabris, valde chartaceis, nervis lateralibus utrinsecus 3–5 supra obscuris, subtus sub lente tantum paulo manifestis, adscendentibus; petiolo \pm 1 mm. longo; floribus solitariis in apice ramulis reductis positis, glabris; calycis tubo 1 mm. longo, lobis lineari-lanceolatis, 1.5 mm. longis; corollae tubo 3 mm. longo, intus fauce barbato, lobis 2 mm. longis, reflexis; antheris 1 mm. longis, inclusis; stylo vix 5 mm. longo, stigmatibus exsertis; fructibus (calyce incluso) 5 vel 6 mm. longis, vix 5 mm. diametro, subglobosis; pyrenis dorso leviter bisulcatis inter sulcos obtusis vel rotundatis, ventre subplanis vel leviter undulatis.

NETHERLANDS NEW GUINEA: Tabati, Jautefa Bay, *Brass* 8849 (TYPE), June, 1938,

abundant in brushes of dry limestone hills of coast (shrub \pm 1 m. high; flowers white; fruit red).

Among the species of *Amaracarpus* already described, this is most like *A. Nymannii* Val. It is very close to *Schlechter 16090*, which collection Valeton determined as aff. *A. Nymannii* Val.; however, the Brass specimen differs in the thicker leaves and faint nervation. Here again the pubescence is fairly fine for *Amaracarpus*. On the other hand Valeton described the hairs of *A. Nymannii* as short and broad. This plant from Tabati is very irregularly branched, the shortest branchlets appearing as rosettes of leaves; if the branchlets are longer they are clothed with remnants of stipules. The calyx-teeth are fairly long and sharp in this species.

Amaracarpus trichocarpus sp. nov.

Frutex circiter 1 m. altus; ramulis subvillosis (pilis crispis, rufis), longitudine valde variabilibus, 2.5–20 cm. longis, internodiis \pm 1 cm. longis, ramulis ultimis in axillis foliorum valde diminutis; stipulis circiter 3 mm. longis, \pm pilosulis, obtuse lanceolatis, caducis; foliis 1.5–2.3 cm. longis, 0.5–0.7 cm. latis, tenuiter chartaceis, elliptico-lanceolatis, apice acutiusculis vel obtusiusculis, basi anguste cuneatis, subsessilibus, utrinque glabris vel subtus costa sparsim pubescente, nervis lateralibus utrinsecus circiter 4, supra obscuris, subtus sub lente manifestis, venulis obscuris; floribus non visis; fructibus in apice ramulorum axillarium valde diminutorum dispositis, sparsim rufo-pubescentibus, subglobosis apice calyce coronatis, circiter 5 mm. longis (calyce 1 mm. longo incluso), calycis lobis 4, lineari-oblongis; pyrenis dorso convexis, ventre medio paulo obtuse costatis, endocarpio crassiusculo.

BRITISH NEW GUINEA: Hohoro, Vailala River, *Brass 1039* (TYPE), rain forests (small compact bush about 1 m. tall; branches horizontal; fruit red).

This species has fruit very much like that pictured by Valeton for *Amaracarpus pubescens* Bl., but the leaves here are much smaller and almost sessile.

Amaracarpus Schlechteri Val. Bot. Jahrb. 61: 116. 1927.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass 13863*, April, 1939, alt. 90 m., common in rain-forest of lower mountain slopes (undergrowth tree 2–3 m. high; branches horizontal; flowers white; fruit red).

This collection has slightly smaller (1.4–1.8 cm. long, 0.6–0.8 cm. broad) leaves more cuneate at the base and somewhat more crowded than those in an isotype of Valeton's species; nevertheless, we believe this is only a variation within the species.

Amaracarpus atrocarpus sp. nov.

Arbuscula usque 3 m. alta; ramis ramulisque \pm pilosulis, ramulis brevibus vel longioribus (4–30 cm. longis), internodiis \pm 1 cm. longis; stipulis membranaceis 3–4 mm. longis verisimiliter glabris apice setis 2, 2 mm. longis et dense pilosis terminatis, caducis; foliis 1.8–2.3 cm. longis, 0.7–1.3 cm. latis, rhombiformi-ellipticis, utrinque angustatis, apice breviter acuminate, acumine circiter 3 mm. longo, acutiusculo, basi acutis, sessilibus vel subsessilibus, chartaceis, utrinque glabris, nervis lateralibus utrinsecus 5 adscendentibus deinde arcuatis, supra inconspicuis, subtus sub lente prominulis, venulis conspersis et inconspicuis vel subobscuris; petiolo

subnullo; floribus solitariis ut videtur axillaribus et terminalibus, sessilibus vel subsessilibus, basi bracteis stipuliformibus suffultis; calycis tubo 1–1.5 mm. longo, lobis 2 mm. longis obtusiusculis; corollae tubo 3.5–4 mm. longo, 1 mm. diametro, fauce dense villosa, lobis 2–2.5 mm. longis; antheris linearibus vix exsertis; stylo 2 mm. longo; disco fere 1 mm. longo, 0.5 mm. diametro; fructibus subpyriformibus apice calyce coronatis, (calyce incluso) 7–9 mm. longis, 3 mm. diametro; pyrenis 5–6 mm. longis, dorso leviter bisulcatis vel obtuse 3-costatis, ventre subplanis.

BRITISH NEW GUINEA: Fly River, 528 mile Camp, *Brass 6741* (TYPE), May, 1936, alt. 80 m., one of the most common and most striking forest undergrowth species (small near tree attaining 3 m.; branchlets and leaves horizontal on the numerous shortly spreading, drooping branches; small white flowers solitary in axils; fruit black).

At first we were inclined to place this collection in *A. papuanus* Val. but the discrepancies between it and Valeton's species as illustrated, *Nova Guin. Bot. 8: t. 126*. 1912, have led us to describe it as new. This collection rarely has any short axillary branches as described and illustrated by Valeton, the leaves are much more sharply acuminate than in the plate, the flowers are apparently axillary subtended by stipule-like bracts although the latter may be very reduced branchlets, and occasionally a fruit is terminal also; the corolla in Valeton's species is subrotate-campanulate, while here it is hypocrateriform, the tube being 3.5–4 mm. long and 1 mm. diameter; in the flower of *A. papuanus* Val. the tube of the corolla is pictured as being as broad as long or slightly broader. The stipules of both are very much alike except that in our species they vary in length, the membranaceous part often being twice as long as the setae at the apex.

Amaracarpus papuanus Val. *Nova Guin. Bot. 8: 501*. 1911; op. cit. 769, *t. 126*. 1912; *Bot. Jahrb. 61: 115* (in key only). 1927.

NORTHEAST NEW GUINEA: Wantoat (Wantot), *Clemens 10977*, Jan. 1940, alt. 1200–1500 m. (small tree; flowers white).

The above cited specimen seems to be more like the plate of this species than anything else which we have at hand. Since the original was collected in Netherlands New Guinea on the other side of the mountains and at a lower altitude, it would seem best, in a group which appears to be as specifically localized as the *Psychotrieae*, to compare it with the type for confirmation.

Amaracarpus xanthocarpus sp. nov.

Arbuscula 2–4 m. alta; ramis horizontalibus, ramulis pubescentibus (pilis adscendentibus), longitudine diversis 1.5–11 cm. longis, ultimis plerumque brevibus 0.2–2 cm. longis; stipulis in vaginam tubulatam tenuiter membranaceam 1 mm. longam connatis apice setis 4 pubescentibus terminatis, caducis, glabris vel pubescentibus; foliis 0.7–1.5 cm. longis, 0.4–0.7 cm. latis, ellipticis vel rhombiformi-ellipticis utrinque angustatis apice acutiusculis vel obtusiusculis, basi cuneatis vel acutis, tenuiter chartaceis, supra glabris, subtus costa praesertim deorsum \pm pubescente excepta glabris, nervis lateralibus utrinsecus 3 vel 4 supra inconspicuis vel subobscuris, subtus manifestis vix prominulis, venis obscuris; petiolo 1–1.5 mm. longo; floribus in apice ramulorum brevium 2–6-fasciculatis, subsessilibus (pedicellis interdum 0.5–1 mm.), bracteatis; bracteis basi

pedicelli dispositis; calycis tubo brevi, vix 1 mm. longo, lobis 4 oblongis obtusis, interdum sparsim ciliatis; corollae tubo 3 mm. longo utrinque glabro, latiusculo 1.5–2 mm. lato, lobis 1 mm. longis, ovatis extus apice leviter barbatis; staminibus 1 mm. longis, antheris supra fauce leviter exsertis; stylo brevi; fructibus subglobosis, 4–5 mm. longis calycis lobis coronatis, pyrenis 4 mm. longis, 3 mm. latis, dorso valde 3-costatis, ventre planis.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12393, Jan., 1939, alt. 1500 m., frequent in rain-forest undergrowth (tree 3–4 m. high; branches horizontal; very small white flowers and green fruit); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass* 12861 (TYPE), Feb., 1939, alt. 1200 m., occasional in rain-forest undergrowth (slender tree 2–3 m. tall; branches horizontal; flowers white; fruits yellow).

In size and shape of leaves and in the glabrous throat of the corolla, this species suggests *Amaracarpus rhombifolius* Val. However, the leaves are not sessile nor contiguous, the calyx-lobes are very obtuse, and the pyrenes are strongly three-costate on the dorsal surface, the middle costa being considerably larger than the others. The seed does not follow the contour of the putamen as to the ribs, the latter being more like appendages than folds in the crusty cover of the seed.

Amaracarpus compactus sp. nov.

Frutex vix 1 m. altus; ramis ramulisque breviter pilosis vel hirtellis, ramulis longitudine diversis 1–13 cm. longis, ultimis plerumque brevibus 0.5–2 cm. longis; stipulis membranaceis \pm 1 mm. longis, subtruncatis, extus breviter pilosis, \pm caducis; foliis 6–10 mm. longis, 3–5 mm. latis, rhombiformi-obovatis, apice brevissime acuminatis, acumine obtuso, basi elongatis et angustatim cuneatis, tenuiter chartaceis, supra glabris, subtus costa puberula excepta glabris, nervis lateralibus utrinsecus \pm 4 supra obscuris, subtus manifestis, venis obscuris; petiolo 1–1.5 mm. longo, sparsim pilosulo; floribus solitariis terminalibus sessilibus; ovario pubescente 1 mm. longo stipulis tecto; calycis tubo 0.5 mm. longo, glabro, lobis 1 mm. longis; corollae tubo 5 mm. longo, fauce dense piloso, lobis 2.5 mm. longis intus granulati-puberulis; staminibus inclusis; stylo 5 mm. longo, stigmatibus exsertis; fructibus (calyce incluso) 6 mm. longis, 3 mm. latis, obovoideis, levibus.

BRITISH NEW GUINEA: East Mount Tafa, *Brass* 4133 (TYPE), May, 1933, alt. 2100 m., common in foothill forest (small compact shrub usually under 1 m. tall; flowers white; fruit smooth, orange-yellow).

The species seems to lie between *Amaracarpus montanus* Val. and *A. cuneifolius* Val. It differs from *A. montanus* Val. in being less hairy, the leaves have shorter petioles and are pubescent along the midrib beneath, and the drupe is obovoid rather than subglobose. It may be distinguished from *A. cuneifolius* Val. by its short branchlets, the stipules are slightly more than half as large as in the latter species and lack the hairy filiform tips characteristic of *A. cuneifolius* Val., and the corolla is more infundibular than hypocrateriform. However, the types of the two should be compared.

Amaracarpus idenburgensis sp. nov.

Arbuscula 2–3 m. alta; ramis ramulisque dense patenti-pubescentibus,

ramulis longitudine diversis 1.5–12 cm. longis, ultimis brevibus; stipulis \pm 1.5 mm. longis, in vaginam tubulatam connatis, truncatis, pubescentibus, membranaceis, caducis; foliis 6–10 mm. longis, 4–6 mm. latis, ovatis, apice obtusiusculis, basi cuneatis, valde chartaceis (crassiusculis), supra glabris, subtus costa puberula novellis puberulis, nervis lateralibus utrinsecus 2–4 utrinque subobscuris vel tantum leviter manifestis; petiolo circiter 1.5 mm. longo, dorso pubescente; floribus apice ramulorum ultimorum 2–5 dispositis, \pm 2 mm. pedicellatis, basi minute bracteolatis, glabris; calyce 1 mm. longo, fere basi 4-fido, lobis ovatis obtusis; corolla campanulata, tubo 1 mm. longo, lobis triangularibus obtusiusculis, 1.5–2 mm. longis; staminibus in fauce insertis, antheris exsertis; stylo \pm 1 mm. longo; disco prominente; fructu ovoideo, 7 mm. longo; pyrenis 6 mm. longis, 4.5 mm. latis, dorso convexis, ventre subplanis.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass 12674* (TYPE), Feb., 1939, alt. 2150 m., mossy forest, one of the few undergrowth trees found amongst scrambling bamboo (2–3 m. high; branches horizontal; flowers white; fruit yellow).

This plant seems most like *Amaracarpus montanus* Val. It differs in the larger and not entirely glabrous leaves, the shorter petioles, and the very short spreading hairs on the branchlets.

Amaracarpus belensis sp. nov.

Arbor 3–4 m. alta; ramis ramulisque dense \pm adpresse rufo-pubescentibus, ramulis 10–14 cm. longis vel versus apicem 1–4 cm. longis, internodiis \pm 1 cm. longis, ramulis ultimis brevissimis plerumque minus quam 1 cm. longis; stipulis 1.5 mm. longis, pubescentibus, in vaginam tubulatam subtruncatam connatis, apice setis 4 pubescentibus; foliis 6–9 mm. longis, 2.5–4 mm. latis, ellipticis vel subrhombiformi-ellipticis, apice obtusis, basi anguste cuneatis, tenuiter chartaceis, supra glabris, subtus praesertim deorsum costa puberula ceterum glabris, nervis lateralibus utrinsecus 2 vel 3 inconspicuis vel subobscuris; petiolo 1–1.5 mm. longo; floribus solitariis in apice ramulorum ultimorum sessilibus vel subsessilibus; calyce cupuliformi 4-dentato, \pm 1.5 mm. longo; corollae tubo 2.5 mm. longo, intus glabro, lobis 1 mm. longis, reflexis; antheris parvis, leviter exsertis; fructibus oblongis, (calyce incluso) 5 mm. longis, 3 mm. diametro, levibus.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass 11055* (TYPE), Nov., 1938, alt. 2300 m., common in forest undergrowth (tree 3–4 m. high; branches spreading horizontally and drooping; flowers white; fruit green).

This plant seems most like the description of *A. anomalus* Wernham, but it is a small tree rather than a subrepent subshrub, and the flowers are only about one-third as large as in Wernham's species.

Amaracarpus simulans sp. nov.

Arbuscula 2–4 m. alta; ramulis dense hirtello-pubescentibus, 3–10 cm. longis, ultimis brevioribus, internodiis vix 1 cm., in ramulis ultimis vix 5 mm. longis, nodis plerumque quam ramulis latioribus; stipulis 1 mm. longis, in vaginam tubulatam connatis, apice truncatis, deciduis, novellis apice minute 4-setosis, sparsim puberulis; foliis ellipticis vel rhomboideis, 4–8 mm. longis, 2.5–5 mm. latis, obtusis, basi cuneatis, utrinque glabris, nervis lateralibus utrinsecus circiter 3. supra obscuris, subtus sub lente tantum leviter manifestis; petiolo circiter 1.5 mm. longo, glabro; floribus

solitariis in apice ramulorum terminalibus, sessilibus, glabris, parvis; calycis tubo 1 mm. longo, lobis 1.5 mm. longis, lineari-oblongis; corollae tubo 2.5 mm. longo, fauce inter stamina minute piloso-barbato, lobis 1.5 mm. longis; antheris partim exsertis; stylo 2 mm. longo; fructibus ellipsoideis vel paulo obovoideis, 7 mm. longis (calyce incluso), 4 mm. diametro, 6-lineatis, vix costatis; pyrenis dorso rotundatis vel convexis, ventre undulatis.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10522* (TYPE), Oct., 1938, alt. 2800 m., common in tall mossy forest of valley bottoms (undergrowth tree 2-4 m. tall; branches flat-spreading; flowers yellow).

If we had not had at hand a specimen of *A. novo-guineensis* (Warb.) Val., we might have been inclined to assign this specimen to that species, in spite of the vast difference in the altitude; however, although the leaves are much alike, the shape of the fruit is different and the calyx is much larger in our species.

Amaracarpus Brassii sp. nov.

Arbor 3-4 m. alta; ramis 4-5 mm. diametro; ramulis 1-1.5 mm. diametro, ultimis vix 0.5 mm. diametro, plerumque brevibus, subadpresse pubescentibus, pilis rufis; stipulis 1 mm. longis, membranaceis, extus pubescentibus, in vaginam connatis, apice subtruncatis setis pilosis terminatis, caducis; foliis dense confertis apice ramulorum subrotundatis, late ovatis vel subreniformibus, apice obtusis vel interdum subrotundatis, basi subcordatis vel emarginatis vel subtruncatis, 1-2 mm. longis, 1.5-2.8 mm. latis, crassiusculis, utrinque glabris, costa tantum visa, supra plerumque subobscura, subtus deorsum manifesta; petiolo gracili, circiter 0.5-0.8 mm. longo; floribus solitariis in apice ramulorum brevium, sessilibus; calyce campanulato, vix 1 mm. longo, 4-5-dentato, ciliato; corollae tubo 2 mm. longo, glabro, lobis 4 vel 5, recurvatis, apiculatis, 0.6-0.8 mm. longis, antheris ellipticis, leviter exsertis; disco valde convexo; stylo 0.8 mm. longo; stigmatibus 2 brevissimis; fructibus ovoideis vel subglobosis calycis lobis coronatis, 3-4 mm. longis, circiter 3 mm. latis, in sicco nigris.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10823* (TYPE), Oct., 1938, alt. 2700 m., rain-forest of valley bottom, occasional in openings (tree 3-4 m. high; branches horizontal, drooping).

This species is very readily distinguished by the crowded unusually small leaves and short branchlets.

Amaracarpus trichanthus sp. nov.

Frutex usque ad 2 m. altus; ramis ramulisque dense pilosulis vel subvillosulis, ramulis ultimis brevibus, internodiis brevissimis; stipulis ovatis vel subrotundis, 1-2 mm. longis latisque, extus pubescentibus deinde giabris, subpersistentibus; foliis confertis, chartaceis, 4-6.5 mm. longis, 2-3.5 mm. latis, ellipticis vel leviter obovato-ellipticis, apice paulo angustatis et obtusis vel rotundatis, basi anguste cuneatis vel acutis, utrinque glabris, nervis lateralibus utrinsecus circiter 2 obscuris vel vix manifestis; petiolo 1 mm. longo, glabro; floribus solitariis in ramulorum brevium terminalibus, sessilibus basi bracteis 2 parvis suffultis; ovario et calyce consperse pilosulo; ovario circiter 1 mm. longo; calycis tubo vix 1 mm. longo, lobis 5 oblongis, acutiusculis, sinibus rotundatis; corolla extus dense pubescente, tubo 13 mm. longo, intus prope medio annulo vix 2 mm.

lato pilosulo, sursum minutissime granulari, lobis 2 mm. longis; staminibus in fauce inferiore insertis, filamentis 1.5 mm. longis, antheris 2 mm. longis, linearibus; stylo glabro; fructibus ovoideis calyce coronatis, 5–6 mm. longis, 3.5 mm. diametro.

BRITISH NEW GUINEA: Murray Pass, Wharton Range, *Brass 4615* (TYPE), July, 1933, alt. 2840 m., abundant in undergrowth in forest (horizontally branched shrub or bush up to 2 m. tall; indumentum dark brown; flowers solitary, corolla pale blue).

Amaracarpus bicolor sp. nov.

Frutex usque ad 1 m. altus, glaber; ramulis brunnescentibus, gracilibus, angulatis vel angustissime alatis, internodiis ultimis brevissimis, nodis paulo tumidis; stipulis membranceis, 1 mm. longis, apice truncatis, deciduis; foliis chartaceis vel tenuiter coriaceis, confertis, spathulatis, 4–8 mm. longis, in parte superiore 2.4–3.5 mm. latis, apice rotundatis, basi in petiolo 1–1.5 mm. longo angustatis, nervis lateralibus utrinsecus 2 vel 3 patenti-adscentibus, supra obscuris, subtus inconspicuis, venis utrinque obscuris; floribus solitariis, in apice ramulorum ultimarum dispositis, sessilibus; calycis tubo 1 mm. longo, lobis 1.5 mm. longis, oblongis, obtusiusculis, sinibus subrotundatis; corollae tubo 1.2 cm. longo, intus dimidio supero \pm pilosulo, lobis 4 mm. longis; staminibus in tertio supero insertis, filamentis brevibus granuloso-puberulis, antheris 2–2.5 mm. longis; stylo 8 mm. longo, in parte supero puberulo, stigmatibus linearibus 1.5 mm. longis; fructibus ellipsoideis, circiter 7 mm. longis, calyce coronatis, levibus.

BRITISH NEW GUINEA: Mount Tafa, *Brass 4019, 5019* (TYPE), May, Sept., 1933, alt. 2310 and 2400 m., fairly common along roadside; also, small undergrowth shrub in damp valley forest (shrub or bush 1 m. or less; branches horizontal; fleshy blue flowers, lobes yellow-tipped).

The flowers of the first collection are not yet open and are described by the collector as blue-green.

Amaracarpus buxifolius (C. H. Wright) comb. nov.

Saprosma buxifolia C. H. Wright, Kew Bull. 1899: 101. 1899.

BRITISH NEW GUINEA: Murray Pass, Wharton Range, *Brass 4766*, Aug., 1933, alt. 2840 m., common as undergrowth in better lighted situations in forests (bush about 2 m. tall; flowers blue); Mt. Albert Edward, southwest slope (Upper Chirima River), *Brass 4379*, June, 1933, alt. 3500 m., a single plant on rocky bank of river (compact low shrub; leaves shining on both sides, the under surface much paler; corolla pale blue with green thick-tipped lobes; fruit compressed, orange-yellow, \pm 1 cm. long).

Amaracarpus confertifolius sp. nov.

Frutex gracilis 1–2 m. altus, glaber; ramis teretibus, ramulis quadrangulatis, plerumque brevibus, internodiis 5–7 mm. longis; stipulis in vaginam connatis, circiter 2 mm. longis, rotundatis vel late obtusis, caducis; nodis tumidis; foliis 6–11 mm. longis, 4–7 mm. latis, ellipticis vel leviter obovatis, apice obtusis vel subrotundatis, basi anguste cuneatis, in sicco margine paulo recurvis, nervis lateralibus utrinsecus 3 vel 4, in laminae facie supera \pm manifestis, infera deorsum magis prominulis, venulis utrinque \pm manifestis; floribus solitariis in ramulis brevibus terminalibus, subsessilibus (pedunculo \pm 1 mm. longo), bracteolatis; bracteolis \pm 3 mm. longis, basi ovatis deinde abrupte longe acuminatis, ut videtur \pm connatis, ovario circumdatis; calycis tubo 1 mm. longo, lobis 2–2.5 mm. longis, sinibus \pm rotundatis; corolla infundibulari, tubo 10–12 mm. longo, intus

prope medio sursum \pm puberulo, lobis 3 mm. longis; antheris 2.5 mm. longis, partim exsertis; stylo brevi, stigmatibus lineari-oblongis; fructibus ovoideis, 7 mm. longis (calyce incluso), 3.5 mm. latis, levibus; pyrenis dorso convexis, ventre planis.

BRITISH NEW GUINEA: Murray Pass, Wharton Range, *Brass* 4715 (TYPE), Aug., 1933, alt. 2840 m., common on pathways through bamboo undergrowth in *Dacrydium-Libocedrus* forests (slender shrub 1–2 m. high, with short horizontal branches; flowers pale blue, fleshy).

This plant is more compact than *A. caeruleus* Merr. & Perry but the flowers are somewhat similar, except that the subtending bracteoles differ, and the flowers of the latter species are definitely pedunculate, the fruit of the latter, too, tends to be ribbed, and the leaves are larger and longer-petiolate. In addition to the number above cited we have at hand a single sheet from East Mount Tafa, *Brass* 4144, gathered at 2100 m. altitude in the tall foothill forest, not common (compact shrub with blue flowers). This number has slightly larger leaves than those of the type, and chartaceous; the one flower on the specimen has the corolla-tube within from the middle upward densely puberulous. These are the only differences we note, except possibly the stipules are slightly puberulous; we are inclined to believe all represent one species under different environmental conditions.

Amaracarpus caeruleus sp. nov.

Arbuscula 2–3 m. alta, glabra; ramulis 4-angulatis, nodis tumidis, internodiis ramulorum ultimorum brevibus, 3–10 mm. longis; stipulis 1–3 mm. longis, obtusis, cito caducis; foliis 1–2 cm. longis, 0.5–1.1 cm. latis, ellipticis vel lanceolatis, apice obtusiusculis vel acutiusculis, basi cuneatis vel acutis, tenuiter coriaceis, nervis lateralibus utrinsecus 2 vel 3 adscendentibus vel patentiadscendentibus utrinque manifestis vix prominulis, reticulo \pm manifesto, laxo; petiolo 3–4 mm. longo; floribus solitariis ut videtur terminalibus et axillaribus, pedunculatis; pedunculo \pm 5 mm. longo; ovario circiter 1 mm. longo bracteolis circumdata; bracteolis 4 decussatis, approximatis, longitudine variabilibus, 2.5–5 mm. longis, ovatis vel lanceolatis, apice elongatis; calycis tubo 1 mm. longo, lobis 1.5–2 mm. longis, lineari-oblongis, acutiusculis; corolla infundibulari, tubo 12 mm. longo, intus medio puberulo sursum granuloso-puberulo, lobis 3 mm. longis, intus granuloso-puberulis; filamentis granuloso-puberulis, antheris 3 mm. longis, lineari-oblongis, basi bilobatis; stylo glabro, stigmatibus linearibus; fructibus ovoideis, (calyce incluso) 7 mm. longis, 3.5 mm. diametro; pyrenis 5 mm. longis, 3 mm. latis, dorso convexis leviter et obtuse 3-costatis, ventre planis.

BRITISH NEW GUINEA: Murray Pass, Wharton Range, *Brass* 4525 (TYPE), July, 1933, alt. 2840 m., common on forest borders (dark foliaged shapely small tree 2–3 m. tall; corolla pale blue with thick-tipped lobes; ripe fruit yellow, about 5 mm. long, 4 mm. diameter).

Amaracarpus Clemensae sp. nov.

Frutex probabiliter 1–2 m. altus; ramulis dense crispe pubescentibus, deinde glabris, \pm angulatis, internodiis ultimis brevibus; stipulis glabris membranaceis, 3–4 mm. longis, in parte inferiore in vaginam connatis, apice subrotundatis, caducis, cicatricibus pilosis; foliis lanceolatis vel

anguste ellipticis, 1–2 cm. longis, 0.4–0.7 cm. latis, apice acutiusculis, basi anguste cuneatis, tenuiter coriaceis, in sicco margine leviter recurvis, utrinque glabris, nervis lateralibus utrinsecus circiter 4 adscendentibus, supra obscuris, subtus sub lente distincte manifestis, venulis obscuris; petiolo \pm 3 mm. longo, glabro; floribus glabris solitariis subterminalibus pedunculatis, bracteolatis; pedunculo 7–11 mm. longo, glabro; bracteolis 4 calycis basi approximatis, persistentibus, paribus decussatis, 7–10 mm. longis, 1–1.5 mm. latis, lineari-oblongis, acutiusculis; ovario et calyce campanulatis; calycis tubo 1.5–2 mm. longo, lobis 1–1.5 mm. longis, lobis et sinibus subrotundatis; corollae tubo 11 mm. longo, intus dimidio supero granuloso-puberulo, lobis circiter 3 mm. longis; filamentis 1 mm. longis, granuloso-puberulis, antheris 3 mm. longis, partim exsertis; stylo 9 mm. longo, stigmatibus 2 mm. longis; fructibus \pm 6 mm. longis, oblongis, calyce coronatis, bracteolis suffultis; pyrenis dorso convexis levibus, ventre planis.

NORTHEAST NEW GUINEA: Rawlinson Range, *Clemens* 12328 (TYPE), June, 1941, alt. 2100–3600 m. (shrub; fruits tomato-red); same locality, *Clemens* 41405, 41943, May, 1940, June, 1941 (shrub 1–1.5 m. tall; flowers white); Ulap Trail, *Clemens* 41168, April, 1940, alpine or subalpine elevation; Sarawaket, *Clemens* 5573, June, 1937, alt. 2400–2700 m.

Amaracarpus Archboldianus sp. nov.

Arbuscula vel frutex; ramulis glabris cortice longitudinaliter rugulosis, nigrescentibus vel cinereo-nigrescentibus; stipulis oblongis, obtusis, circiter 7 mm. longis, cito caducis, cicatricibus pilosis; foliis 1.5–4 (plerumque 2.5–3) cm. longis, 0.8–2.3 (plerumque 1.2–1.8) cm. latis, ellipticis vel lanceolato-ellipticis, brevissime acuminatis (acumine 2 mm. longo, obtuso) vel acutiusculis, basi cuneatis vel rotundatis deinde breviter cuneatis, in sicco margine leviter recurvis, tenuiter coriaceis, supra glabris, subtus costa praesertim deorsum patenti-pubescente excepta glabris, nervis lateralibus utrinsecus 6 vel 7 supra manifestis, subtus prominulis, oblique patentibus ante marginem abrupte confluentibus, reticulo utrinque distincte manifesto, laxo; petiolo 8–10 mm. longo, novello subtus pubescente, glabrato; floribus glabris, ebracteolatis, subterminalibus, interdum solitariis plerumque 2(–3)-fasciculatis, pedunculatis, pedunculo interdum sparsim pubescente, 1–1.5 cm. longo; calycis tubo campanulato-cupuliformi, 3 mm. longo, lobis 2 mm. longis, oblongis, obtusis, sinibus obtusis vel subrotundatis; corolla infundibulari, tubo 1.5–1.7 cm. longo, intus dimidio supero granuloso-puberulo, lobis 4 mm. longis; filamentis brevibus, granuloso-puberulis, antheris 3 mm. longis, vix exsertis; stylo 1.1 cm. longo; stigmatibus linearibus; fructibus immaturis, oblongis, 1.1 cm. longis (calyce incluso).

BRITISH NEW GUINEA: Murray Pass, Wharton Range, *Brass* 4614 (TYPE), July, 1933, alt. 2840 m., very common substage bush or small tree (dark smooth leaves, paler and glossy beneath; flowers in axillary pairs, one maturing long before the other; corolla-tube yellowish, lobes puce-colored and very thick).

Very closely related and perhaps representing the same species is the following collection: Mt. Albert Edward, southwest slope (Upper Chirima River), *Brass* 4373, June, 1933, alt. 3500–3550 m., common as undergrowth in valley forests (small spreading tree or bush 1–2.5 m. tall; leaves very dark and glossy above, midrib whitish; corolla fleshy, greenish white with lavender-colored lobes).

This latter specimen differs from the type as follows: the branchlets are crisply pilose on the younger parts, the older are glabrous, the bark is gray,

the leaves are narrower, at most 1.5 cm. broad, and more sharply pointed, the costal veins are more prominent than the reticulations, and in the axils of the primary veins of the lower half of the leaves are minute domatia. The flowers vary greatly in size, but the largest ones could not be distinguished from those in the type-collection. The mode of inflorescence is similar; the fact that the inflorescence is found at the terminal node or the second from the apex leads us to believe this position may be indicative of a sympodial growth of the stem.

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SACCHARUM ROBUSTUM AND OTHER WILD RELATIVES OF "NOBLE" SUGAR CANES

CARL O. GRASSL*

With three plates

SINCE 1928, when an expedition led by Dr. E. W. Brandes of the United States Department of Agriculture explored New Guinea in search of sugar canes (5), an unusually large wild relative of the noble or large tropical sugar canes has been known to sugar cane technologists. Living specimens have been distributed to the major sugar cane stations of the world, and sugar cane breeders have utilized them in the development of new commercial sugar canes. During this period, the wild sugar cane in question has been passing under a nomen nudum (*Saccharum robustum*).

The earliest publication in which the name *Saccharum robustum* occurs was by Brandes in 1929 (5). The name was selected by agreement with Dr. J. Jeswiet, who was the first member of the expedition to see this wild cane. Dr. Jeswiet found the green form on the banks of the Laloki River in the Territory of Papua (British New Guinea) (*Pl. III*), and Dr. Brandes shortly afterward found the striking red form on the Sepik River in the Territory of New Guinea (Northeast New Guinea). It was understood that Dr. Jeswiet was to prepare and publish a description of this new species. Dr. Jeswiet, however, never validated this name so far as can be discovered. Numerous discussions of this species have been published by sugar cane technologists, but no botanical description, constituting technical publication, has as yet appeared. This paper has been prepared in order to correct this situation and to present some data with respect to this interesting wild *Saccharum* and closely related grasses. The name consequently becomes:

Saccharum robustum Brandes and Jeswiet, sp. nov. Pl. I, III.

Perenne. Culmi robusti, erecti vel inclinati usque ad 10 m. alti, glabri, plurinodes, cerosi (infra nodos dense cerosi), diam. 2-3 cm. Foliorum vaginæ hirsutæ usque ad 40 cm. longæ. Ligula brevissima (1.5-4 mm.), membranacea, parum ciliata. Laminæ lineari-lanceolatae, 1.2-2 m. longæ, 3-7 cm. latae, glabrae vel pubescentes, margine serratae. Culmi infra paniculam sparsim appresso-pubescentes. Panícula amplissima. 40-90 cm. longa, effusa; rhachis communis sparsim appresso-sericeo-pubescent. Spiculæ sessiles et pedicellatae similes, 3 mm. longæ, unifloræ. Prophyllæ¹ bicarinatæ binervæ. Gluma prima 1-nervis. Gluma secunda enervis, hyalina, apice ciliata. Gluma tertia absens vel

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tenuis. Palea parvula, hyalina, enervis, apice ciliata. Lodiculae glabrae. Stamina 3. Stigmata purpurea.

An extremely variable perennial, forming compact tufts to large, dense canebreaks up to 10 m. high (in cultivation, culms that flower the first year are 4-5 m. high). Culms are erect or reclining, unbranched, many-noded, green to yellowish brown sometimes tinged with red, 2-3 cm. in diameter, diameter greatest near the nodes in the growth ring (a pulvinar structure above the root band), solid or with a small pith cavity. Rhizomatous or stoloniferous, with stolons long-jointed, flexuous, 1-1.5 cm. in diameter, sometimes creeping for long distances, up to 20 m. The rind of the culms is very hard and woody with a wax coating that is most prominent in a band below the nodes. The root band has 2-5, sometimes more, rows of root primordia and is surmounted by a swollen growth ring which is colored yellowish to red or reddish brown. The leaf-blades are glabrous to finely pubescent, flat, strongly midribbed, linear-lanceolate, 1.2-2 m. long and 3-7 cm. wide, the greatest width of blade about two-thirds of the distance from the base and the margins finely serrulate. The leaf-sheaths are 25-40 cm. long, coarsely hairy, overlapping about 2 internodes and topped by a ligule which is 1.5-4 mm. long. The inflorescence is a large feathery or plume-like panicle, with the branched portion 40-90 cm. long and sparsely short-pubescent. The branches of the panicle are long, slender, jointed, and somewhat fragile, with the spikelets in alternate pairs, one sessile, the other stalked. Disarticulation of rachis occurs below a ring of silky hairs, up to 1 cm. long, which sparsely surround the spikelets; the pedicellate spikelets become free while the sessile spikelets remain attached to the base of a 4-7 mm. long segment of the rachis. Also attached to the base of such rachis segments is a 2-3 mm. long pedicel of the pedicellate spikelet. Spikelets are similar, perfect, about 3 mm. long, with a flower in the axil of the third glume¹ (very rarely with a second flower in the axil of a fourth glume). The prophyllum is coriaceous, bicarinate with 2 (rarely 4) nerves and a minutely scabrous apex. The first glume is coriaceous, partially enclosed in the wings of the prophyllum, 1 (rarely 3-) nerved, minutely scabrous at apex and with inrolled, hyaline and ciliate margins. The second glume is hyaline, nerveless, with ciliate margins at apex. The third glume (first lemma) is absent or reduced to a slender, hyaline, minutely scabrous-tipped structure, up to 2 mm. long, and almost hair-like in diameter. The palea is hyaline, nerveless, up to 1 mm. long, with ciliate margins. There are 2 lodicules, not ciliate. There are 3 stamens with anthers about 1.5 mm. long. The pistil has purplish stigmas. The seeds are 1.5 mm. long.

NEW GUINEA: S.P.H.² nos. 908, 504, 152, 229, 1097, and 222 from clone 28 N.G.

¹ By third glume is here meant the fourth appendage or first lemma, as the first appendage in the spikelets of Andropogoneae, Tripsaceae, and some Bambuseae is considered homologous with a prophyll and not with the first glume of other grasses. The first appendage in the spikelets of such grasses is here called a "prophyllum" and the second appendage the first glume.

² Sugar Plant Herbarium of the United States Department of Agriculture. The different numbers refer to collections made at different times and places from the clone in question. A living collection of more than 1,000 clones of sugar canes and related grasses is now being maintained at Canal Point, Florida, Summit, Canal Zone, and in part at Beltsville, Maryland. Many of the herbarium specimens referred to in this

251, Imp.³ 496, found by *J. Jeswiet* on the left bank of the Laloki River near Jail Gardens about 27 km. from Port Moresby, Territory of Papua, June 1928 (TYPE: no. 908 deposited in the U. S. Nat. Herb.); S.P.H. nos. 895 and 1093 from clone 28 *N.G.* 104, Imp. 653, found on the bank of the Kemp Welsh River near Ni-u-iruka, Territory of Papua; S.P.H. no. 1221, coll. by *J. T. Puxley* from Vailala River, Territory of Papua, 1935; in dense pure stands 7-8 m. high on recent silt deposits of the Idenburg River, Netherlands New Guinea, 50 m. alt., coll. by *L. J. Brass*, no. 13791, April 1939; colonizing sand and gravel beaches of the Idenburg River, 850 m. alt., 4 km. s. w. of Bernhard Camp, coll. by *Brass*, no. 13264, March 1939; *C. Boden Kloss*, Camp 1, Nov.-Dec. 1912, 5,000 ft. alt., Utakwa Expedition to Mt. Carstensz, Netherlands New Guinea (Kew Herb.⁴); S.P.H. nos. 904 and 663 from clone 28 *N.G.* 218, Imp. 663, found near Ambunti on the Sepik River, Territory of New Guinea; S.P.H. no. 1519 from clone *Molokai* 4730, Imp. 1027, a selection from seed from the Francisco River, Territory of New Guinea, alt. 3 m.; S.P.H. no. 1520 from clone *Molokai* 4826, Imp. 1028, *ibid.*; S.P.H. no. 1521 from clone *Molokai* 5193, Imp. 1029, a selection from seed collected on the plateau at headwaters of the Ramu River, Territory of New Guinea, alt. 1650 m.

NEW BRITAIN ISLAND: S.P.H. nos. 916, 177, 678, and 1100 from clone 28 *N.G.* 289, Imp. 677, coll. by *C. E. Pemberton* from dry, rocky place near Rabaul; S.P.H. nos. 1101, 178, 679, and 917 from clone 28 *N.G.* 290, Imp. 622, a selection from seed coll. by *Pemberton* near Rabaul.

NEW HEBRIDES: S.P.H. no. 1351 from clone *N.H.* 1, Imp. 933 (vernacular name: *Nassa-u*) obtained near Imera, Efate, by *E. W. Brandes* in 1935; U. S. Nat. Herb. no. 1539004 from Pentecost I., coll. by *A. Morrison*, May 28, 1896 (also seen in Kew Herb.).

The specimen from Pentecost I. is not quite typical in that the inflorescence is somewhat smaller than normal. This may be a smaller form of this species, the introduction of which into experimental cultivation is desirable, as the discovery of a form with a chromosome number of $2n = 40$ or less would have considerable theoretical interest.

Saccharum robustum Brandes & Jeswiet f. *sanguineum* Grassl, f. nov.

Culmi extus intusque sanguinei.

NEW GUINEA: S.P.H. no. 1525, 1526, and 1527 from clone 28 *N.G.* 219, Imp. 975, found along the Sepik River near Ambunti, Territory of New Guinea (TYPE: no. 1525 deposited in the U. S. Nat. Herb.); S.P.H. no. 1538 from clone 28 *N.G.* 219A, Imp. 976, found in the same canebrake by *Father Kirschbaum*.

This form differs from the typical form in having a blood red color to the interior of the culms. This color is most intense near the rind and grades off to almost a white in the center of the pith. It is also evident externally in a dark red rind color, deep red buds, dewlaps, and growth rings, and a purplish pink cast to the spikelets.

paper were prepared by Dr. G. B. Sartoris and the late Mr. H. B. Cowgill, while the collection was being maintained in Puerto Rico, and at Arlington Farm, Virginia. Specimens of clones of particular botanical interest can be prepared for exchange.

³ Imp. = Importation number assigned by Division of Sugar Plant Investigations.

⁴ After this paper was submitted for publication an opportunity was had to amend it after examining additional material at the Kew Herbarium and places in England where parts of the herbarium were sent for preservation during the war. The courtesy and assistance extended to me by the Kew Herbarium authorities are gratefully acknowledged.

The types of this form and of the species are specimens from the two largest wild clones of *Saccharum* in cultivation. The importance of this form was immediately recognized by Dr. E. W. Brandes, who found it about 430 km. up the Sepik River in 1928. Special efforts were made to bring it into experimental cultivation at that time, but the original plants died and it was not until almost ten years later, after repeated attempts, that it was established in the living collection of the Division of Sugar Plant Investigations. This was accomplished through the courtesy of the Director of the Department of Agriculture of the Territory of New Guinea, who dispatched a patrol officer to the area on three occasions to get cuttings. A lighter-colored variant of this form was likewise received from who accompanied Dr. Brandes on the Sepik in 1928.

The type locality in 1937 from the late Father Franz Joseph Kirschbaum, the purple pink cast to the spikelets of the herbarium specimens collected by Brass from the nearby Idenburg River indicates that these may belong to this form or are closely related. Brass does not indicate the color of the culms of the plants from which these collections were made.

Besides the clones of *Saccharum robustum* listed so far in this paper, there are several in our collection that were recently obtained from the Hawaiian Sugar Planters' Association under Molokai numbers. These clones are not referred to in all cases because the preparation of flowering material of some of them was overlooked during the war emergency. Detailed descriptions of the vegetative characteristics of these and others in our collection have been prepared by Artschwager (2). They represent selections from thousands of seedlings grown in quarantine on Molokai Island from seed collected from wild plants in various parts of the Territory of New Guinea (i.e., Northeast New Guinea: Francisco River, alt. 3 m.; Markham River, alt. 150 m.; Bulolo River, alt. 600 m.; Plateau at headwaters of the Ramu River, alt. 1650 m.; and Plateau at headwaters of the Purari River, alt. 1650 m. New Britain: Warangoi and Toriu Rivers, Gazelle Peninsula). A report on the expedition that collected the seed has been published by C. G. Lennox (17).

The presence of *Saccharum robustum* in the Solomon Islands can be expected on the basis of the known distribution. The eastern limit of this species appears to be in the New Hebrides. Plants from Viti Levu, Fiji Islands, which simulate this species will be discussed later in this paper under *Erianthus*.

The distribution of *Saccharum robustum* in Netherlands New Guinea is not well known. What appears to be an illustration of this species is reported by Lam (15, Fig. 25), under *S. spontaneum* L., as growing in large patches along the banks of the Mamberamo River. Herbarium specimens were not collected by Lam (16). His reference to this *gelagah* (4) (Javanese name for *S. spontaneum*) as often being 9-10 m. high is good evidence that it is *S. robustum*. The collections of *S. robustum* by Brass from the Idenburg River, a headwater stream of the Mamberamo

River, is further evidence that the numerous patches of *Saccharum* noticed by Lam along the Mamberamo River belong to this species. Collectors visiting the Mamberamo River, particularly when in the Meervlakte region, should be sure to collect *Saccharum* from the marshy localities also, as *S. spontaneum* can be expected in such habitats. *Saccharum robustum*, from what is known at present, seems to prefer well-drained river-banks.

The occurrence of *Saccharum robustum* or closely related forms west to the Celebes and Borneo seems possible. Wild grasses which may be *S. robustum* have been reported by Bremer (8, 9, 10) under the vernacular names of *Tanangge* and *Teboe Salah*. *Tanangge* is a vernacular generic name for sugar cane and related wild grasses in the Celebes, while *Teboe Salah* is used for a similar wild grass in Borneo. An attempt to obtain these wild grasses before the Japanese invaded Java was unsuccessful.

Vernacular names have considerable ethnobotanical interest and, consequently, it may not be out of place to note some variations of *Teboe Salah* or false cane. Backer (3, p. 39) refers to *Tebhoe sala* as a vernacular name of *Saccharum spontaneum* in Java, Burkill (12, p. 1924) as *Tebu Salah* under *Erianthus arundinaceus* (Retz.) Jesw. in the Malay Peninsula, and Rumphius (Herb. Amb. 4: 21, t. 6) as *Tubu Sala* under *Arundo farcta* II.

Before discussing the relationships of *Saccharum robustum*, a brief account of what is known of the chromosome number of representatives of this species is presented. Chromosome numbers referred to in this report, unless otherwise acknowledged, are based on unpublished studies in the files of the Division of Sugar Plant Investigations by Ruth C. McGuire (formerly R. C. Starret), assistant cytologist. Chromosome numbers of most of the different clones of *S. robustum* in our collection may be found in the report by Artschwager (2). Of particular interest is the fact that all multiples of 10 from $2n = 60$ to $2n = 120$ seem to be represented in this diverse group. The predominant number appears to be $2n = 80$, represented by clones from New Guinea, New Britain, and the New Hebrides. Three clones from New Guinea, including the two under forma *sanguineum*, have $2n = 70$. Only one in the collection, also from New Guinea, has a count of $2n = 60$, which is the same number assigned by Bremer to *Tanangge* and *Teboe Salah*. Two clones, including the type, with $2n = 84$ approximately, are likewise from New Guinea. New Britain Island, besides being represented by two clones with $2n = 80$, has one each with $2n = 90, 100, 110$, and 120 , approximately. In spite of the heteroploidy found in this group, there appears to be no good morphological basis on which more than one species can be recognized.

The closest wild relative of *Saccharum robustum* undoubtedly is *S. spontaneum*. *Saccharum robustum* is distinguished readily from *S. spontaneum*, however, on the basis of the reduced or absent third glume (first lemma) and the sparser and shorter nature of the hairs on the main axis of the inflorescence and subtending the spikelets, as well as by the smaller size of the various spikelet structures. The much larger size of the

inflorescence and of the vegetative structures also facilitate a ready differentiation.

Hybridization between *Saccharum robustum* and *S. spontaneum* appears to be possible, as Brandes and Jeswiet observed intermediate forms and Lennox (17) reported seeing some natural hybrids where these two species occurred close together. A clone in our collection, 28 N.G. 105, Imp. 654, with a chromosome count of $2n = 140-148$, from near Ni-u-iruka on the Kemp Welsh River, New Guinea, appears to be somewhat intermediate between these two species. In view of the considerable theoretical interest in the exact nature of hybrids between these species, it seems desirable that artificial hybrids be produced before taxonomic recognition be assigned. Sugar cane breeders who are accustomed to using self- or male-sterile plants as females when making crosses may find it advantageous to try the hot-water emasculation technique, developed by Stephens and Quinby (21) for *Sorghum* hybridization work, when trying to make crosses between self-fertile wild grasses.

In order to clarify the status of *Saccharum spontaneum* in areas in which *S. robustum* has been found, such specimens as are available to me are here cited:

Saccharum spontaneum L.

NEW GUINEA: S.P.H. nos. 894, 1092, 651, and 127 from clone 28 N.G. 101, Imp. 652, found near Ni-u-iruka on the Kemp Welsh River, Territory of Papua; S.P.H. nos. 1413, 352, and 1354 from clone 28 N.G. 291, Imp. 875, a selection from seed collected by P. H. Leigh in Eriama swamp about 20 km. from Port Moresby on the road to Rona Falls, Territory of Papua; S.P.H. nos. 1414, 353, and 1355 from clone 28 N.G. 292, Imp. 876, *ibid.*, 13 km. from Port Moresby; S.P.H. no. 223 from along the road between Port Moresby and Rona Falls by Jeswiet, Aug. 7, 1928; S.P.H. no. 1529 from near Sapphire Creek by Brandes & Jeswiet, June 19, 1928; on roadside in savannahs, Rona, Laloki River, alt. 450 m., Brass no. 3628; abundant on alluvial soil of riverbanks in clumps about 2 m. high, Balim River, Netherlands New Guinea, alt. 1600 m., Brass no. 11778, Dec., 1938; very abundant in 2.5-3 m. high thickets on abandoned garden land 18 km. n. e. of Lake Habbema, alt. 2200 m., Bele River, Brass no. 11374 Nov., 1938.

Special attention is called to the collection by Brass from near Lake Habbema in Netherlands New Guinea, as it represents an extremely interesting form of this species. It differs from the typical form of *Saccharum spontaneum* in that the hairs on the main axis of the inflorescence and subtending the spikelets are a straw or brownish yellow color instead of silvery or silky white. Clones with this characteristic color should be brought into experimental cultivation, as a better understanding of the factors involved is likely to solve some of the problems with respect to some of the odd color types of native garden sugar canes that are not explainable on the basis of *S. robustum* forma *sanguineum*. Reference is made to native garden sugar canes which have such straw-colored hairs (clone 28 N.G. 287, Imp. 676, with vernacular name *Huwa*, from Wajake Lo, New Guinea), as well as to others with a brown color to the interior of their culms.

The chromosome numbers of the few clones of *Saccharum spontaneum*

in our living collection from New Guinea are not well understood. The three clones in question have $2n = 96, 114-116$, and $84-88$, respectively. A fourth clone, 28 N.G. 293, Imp. 877, from the Vailala River, is not considered here because flowering material is not available and the vegetative characteristics are not quite typical. For the benefit of those not familiar with the complexity of this species, it is interesting to note that clones with $2n = 48, 50, 56, 60, 64, 72, 80, 90, 94, 96, 98, 112, 120$, and 128 supposedly exist (1, 6). The smallest numbers so far discovered are from small plants obtained from the northern extremity of the range of this species along the banks of the Amu Darya in Turkmenistan, the Syr-Darya in Uzbekistan, and near Lahore, India. On the basis of the very small size of some herbarium specimens from China in the U. S. National Herbarium, it is suggested that even lower numbers can be expected when plants of this species from the northern extremity of the range in southern China are examined. Chromosome numbers of forms from the tropics of Africa are not known.

Saccharum spontaneum will not be considered further at this time because none of the numerous elements in this extremely polymorphic group appear to have been involved importantly in the origin of the noble sugar canes. Incidentally, they may have been a modifying influence, but only a few of the many native garden sugar canes of New Guinea have some important characteristics in common with this species. The cultivated sugar canes that are most closely related to *S. spontaneum* are those from China and India that are known to sugar cane technologists under the horticultural species *S. sinense* Roxb. and *S. Barberi* Jesw. respectively (6, 14).

Relationship of *Saccharum robustum* to cultivated species of *Saccharum* will now be considered. Of the two horticultural species of *Saccharum*, *S. edule* Hassk. and *S. officinarum* L., which appear to be related to *S. robustum*, *S. edule* will be considered first. *Saccharum edule* is a relatively small group of plants that has never been very well understood by botanists. A reason for this is the absence of specimens in herbaria and botanical gardens. Only eight clones of this interesting group are in our living collection. Seven of these were obtained by the U. S. Department of Agriculture expedition to New Guinea in 1928, while the other clone, *Teboe Troeboeg*, Imp. 724, had been obtained previously from Java. The latter is of considerable botanical interest because it appears to be very similar to, if not identical with, the *trubu* referred to by Hasskarl and Rumphius. A photograph of the abortive inflorescence of *Teboe Troeboeg*, Imp. 724, in a dried condition and of another clone, 28 N.G. 201, Imp. 509, from near Lei, on the north coast of the Territory of New Guinea, in a fresh condition gives an idea of the singular appearance of this horticultural species (PL. II, figs. 1, 2).

Although the abortive inflorescence of this grass looks somewhat like a banana in the photograph, a resemblance to a mass of small fish eggs apparently led natives to call it *tellor ican*, as listed by Rumphius (Herb.

Amb. 5: 191-192, t. 75, fig. 1) under *Ova piscium*. Vernacular names now in use for plants of a similar nature are fairly numerous. *Tebu telur* is a Malay name for this plant according to Burkill (12, p. 1929), while Backer (3, p. 40) lists *Teboe telur* (Malayan), *Teboe endog* (Javanese), and *Tiwoe toeroeboes* (Sundanese). Bremer (10, p. 154) refers to a *Teboe Tigoe Tenggaron* from central east Borneo as having the cauliflower-like panicle. Vernacular names for clones of this species in New Guinea are much more various. Those noted by the U. S. Department of Agriculture expedition under Dr. Brandes include *Urugu* from the village of Medeni (clone 28 N.G. 38, Imp. 477), *Jahuni* from Jovi (clone 28 N.G. 49, Imp. 639), *Gauka* from Bodogoru (clone 28 N.G. 82, Imp. 647), *Ito* from Ututi, Kikori River (clone 28 N.G. 270, Imp. 669), *Ito Itoika* from Daru (clone 28 N.G. 272, Imp. 670), *Bogo* from Wajake Lo (clone 28 N.G. 286, Imp. 497), and *Apia-Baina* from Bodogoru (not established in our collection).

Detailed descriptions of the vegetative structures of the clones of *Saccharum edule* in our collection have been prepared by Artschwager (2). It is interesting to note that the vegetative characteristics of *S. edule* and *S. robustum* are similar except for relatively minor differences. The leaves of *S. edule*, for example, do not have as hairy a sheath. The blades of many of the clones of *S. edule* are much more densely pubescent, almost velvety, while this characteristic is rare or very much suppressed when not completely absent in *S. robustum* as now understood. Some of the wild canes of Borneo which are reported to be densely pubescent (10) may, however, be found to be referable to *S. robustum* when material becomes available for study.

With respect to the distribution of *Saccharum edule*, it is important to remember that only vegetative means of reproduction can be functional. Furthermore, the dry and pithy culms of this horticultural species make it very difficult to establish it in a new location. This is true particularly if more than a short period of days intervenes between the preparation of cuttings and their planting. Hostility and constant warfare between tribes of Melanesians would further bar the distribution of any but the more easily propagated sugar canes. This would indicate that the present distribution would, for the most part, be similar to or only slightly larger than the distribution of the wild species from which it was derived. The distribution of *S. edule* and of *S. robustum* has not been fully or very accurately determined. We do know, however, on negative but fairly conclusive evidence, that *S. edule*, like *S. robustum*, does not occur on islands east of the New Hebrides. A large grass which is utilized in a similar manner in the Fiji Islands appears to belong to another genus and will be described later in this paper under *Erianthus*.

Some of the consequences of dependence on vegetative reproduction are phylogenetically important. Because of obligatory vegetative reproduction, clones of *Saccharum edule* can be considered as truly ancient plants. Except for the possibility of vegetative mutations, they should be the same as when first discovered, possibly thousands, if not tens of thousands, of

years ago. Consequently, they may have minor characteristics that have long since disappeared from their contemporary wild relatives.

Dependence on vegetative reproduction would also indicate that no single origin would be sufficient to account for the cultivation of this group in which all of the few clones available to us are considerably different. The morphological differences between our eight clones of *Saccharum edule* consist primarily in the distribution of hairs on the prophylls and leaves and in the color, size, and shape of the vegetative parts. The chromosome numbers, which range from about $2n = 70$ to $2n = 120$, are all different except for two that appear to have $2n = 80$. Opportunities of improving such sterile plants by vegetative selection over reasonable periods of time appear almost nil. Improvement in such groups is more likely accomplished by new discovery of abortive forms and discarding of the inferior ones.

In view of the complete absence of floral parts in *Saccharum edule*, all evidence with respect to the origin of this group is at present based on vegetative characteristics. These indicate that it is more closely related to *S. robustum* than to *S. spontaneum* or any other wild grass now known from the region in question. This statement could be enlarged to include cultivated grasses as well, specifically the noble sugar canes, since the differences between these two cultivated groups is considerable, even though they are very close relatives of *S. robustum*.

The relationship of *Saccharum robustum* to the noble sugar canes, also referred to as *S. officinarum*, is considerably more complicated than the relationship between *S. robustum* and *S. edule*. This is due to the fact that the noble sugar canes comprise a very complex group. As commonly used, the term "noble sugar canes" includes all large thick-stemmed tropical sugar canes that are cultivated by natives in the western Pacific area and southeastern Asia for chewing purposes. Most commercial sugar canes, nearly all of which have been produced by breeding in quite recent times, as well as the smaller Chinese and Indian commercial sugar canes, are not included in this group, although many commercial varieties have a generous admixture of noble "blood." In recent years, the Latin binomial *Saccharum officinarum* has been generally used for this group, as well as for more or less inclusive groups. Many writers, when referring to cultivated sugar canes of any derivation whatsoever, qualify their first reference to sugar canes by this name. In contrast to this broad interpretation, the very careful Dutch sugar cane technologists (8, 10, 14, 19) set up narrower and narrower limits to this group until Bremer (9) concluded that only noble sugar canes with $2n = 80$ chromosomes were *S. officinarum* and all the others were hybrids.

Unfortunately, the group in question is not as simple as this would imply. Many more noble sugar canes have been brought into experimental cultivation since Bremer came to his conclusions. An examination of some of these indicates that a further qualification is necessary if we are to accept his conclusions. This qualification would be that only a part

of the noble sugar canes with $2n = 80$ chromosomes are similar to the group he had in mind. This statement is based on observations of some 72 clones of noble sugar canes in the living collection of the Division of Sugar Plant Investigations with $2n = 80$ chromosomes. Some of the clones with this number of chromosomes from Hawaii and New Caledonia do not seem to belong in this group. Reference will be made to them under the discussion with respect to relationships with *Erianthus maximus*.

The importance of the work of Bremer and other Dutch technologists in calling attention to this group lies in the fact that it has brought sharply into focus what undoubtedly is the most important element in the great diversity of forms collectively known as cultivated sugar canes. The group in question — represented by such clones as *Batjan*, *Black Cheribon*, *Crystalina*, *Fiji*, *Gestreept Preanger*, *Otaheite*, and *Simpson* and seedlings of these as *B.H. 10/12*, *D-74*, *E.K. 2*, *S.W. 3*, *D.I. 52*, etc. —, although small in number, has been the backbone of the sugar industry since the last years of the Eighteenth Century, when the historic clone now known as *Creole* began to be displaced in the Western Tropics. Even now, sugar cane breeders still find it necessary to backcross to elements of this group when they wish to obtain high sucrose and low fiber varieties.

In view of the great importance of the group referred to in the above paragraph, it appears desirable to follow the lead of the Dutch workers and at least recognize this group as the basic element of *Saccharum officinarum*, if not necessarily the only element. No type specimen of *S. officinarum* exists (18), and following customary botanical procedure might lead to absurdities, as the only sugar cane extensively grown in southern Europe and the Western Hemisphere at the time of the formation of this binominal and for centuries before was the clone called *Creole*, which appears to be a very odd hybrid type with $2n = 81$ chromosomes. The designation of a lectotype for this horticultural group — *S. officinarum* — might best be delayed until further material becomes available and more detailed studies, particularly cytogenetic, have been undertaken. When reference is made hereafter to *S. officinarum* in this paper, it is to be interpreted as meaning the sugar cane clones mentioned in the preceding paragraph.

A monograph of the cultivated sugar canes is not yet possible because many areas (Easter Island, Marquesas Islands, Solomon Islands, Spice Islands, Borneo, Malay Peninsula, Indo-China, to mention only the most important) have not been adequately searched for representative groups of garden sugar canes, and they represent gaps in our collection of important geographic groups. Furthermore, many of the sugar canes already in experimental cultivation are not represented by flowering material in any herbarium. Only about 200 native garden sugar canes are represented by flowering material in the U. S. Sugar Plant Herbarium. There may have been a more extensive collection, particularly of the Netherlands Indies forms, at the Eastern Java Experiment Station. Coöperation between the various sugar cane stations will again be necessary to advance

these studies rapidly on a broad front. The flowering of many sugar cane clones is very erratic, and therefore progress in obtaining flowers is accelerated by teamwork under different environments. An added reason for close collaboration is that a clone under a given name at one station may be totally different from a clone under the same name at a different station. Moreover, identical clones may be carried at two or more stations under different names.

Saccharum officinarum is considerably different from *S. robustum*. The vegetative characteristics of *S. officinarum* will not be considered here because they have been influenced radically by the selective ability of primitive horticulturists and consequently do not help very much in determining relationships. The floral parts of *S. officinarum*, in contrast to those of *S. edule*, have not been utilized by primitive man, and they consequently are not consciously modified but give valuable indications as to relationships. Taken by themselves, the floral parts of the group of noble sugar canes called *S. officinarum* are readily distinguished from similar parts of *S. robustum*. The inflorescence, as a whole, is shorter, broader, and coarser. The rachis segments are stouter and not as long relatively with respect to the size of the spikelets. The spikelets of *S. officinarum* are easily distinguished from those of *S. robustum* in that all the parts are slightly larger. Accompanying this increase in size of the spikelet parts is an increase in the number of vascular bundles in some of the parts. The prophyllletum of *S. officinarum* generally has 4 rather than 2 veins as in *S. robustum*. The first glume has 3 veins rather than 1, whereas the second glume has 1 in contrast to none. Only the third glume is similar in that it is absent or greatly reduced in both groups. On the basis of these morphological differences the relationship between *S. robustum* and *S. officinarum* is not very close.

The principal evidence for any relationship whatever between *Saccharum officinarum* and *S. robustum* is based on limited cytogenetic data on hybrids between members of these groups. Hybridization between *S. officinarum* and *S. robustum* is readily accomplished by using *S. officinarum* as the female parent and results in F_1 seedlings that have a larger chromosome number than the sum of the monoploid numbers of the parents (6). The increase in chromosome number beyond the sum of the monoploid numbers of the parents is only about one-half as great as when *S. spontaneum* is used as the male parent and, consequently, it is surmised that *S. officinarum* and *S. robustum* possibly have as many as 20 chromosomes in common. More work in this direction is indicated, using clones of *S. robustum* with $2n = 60, 80$, and 100 chromosomes.

Of considerable interest with respect to relationships between *Saccharum robustum* and noble sugar canes other than *S. officinarum* are the numerous clones obtained in native gardens in New Guinea by the U. S. Department of Agriculture expedition of 1928. Morphologically many of the clones of noble sugar canes from New Guinea are so similar to *S. robustum* in floral characteristics that differentiation on this basis alone is very difficult

if not frequently impossible. The same, however, may be said of the hybrids between *S. officinarum* and *S. robustum*. The problems presented by this resemblance are of great interest and importance. What one would like to know is whether these clones are all hybrids between *S. officinarum* and *S. robustum* or if some of them are direct derivatives of *S. robustum*. Clones in which hybridization with *S. spontaneum* may have been involved introduce complicating factors but are more readily differentiated from the others. The complexity of the situation results from the ease with which hybridization takes place between the several groups in question. Answers may be forthcoming when additional material becomes available and further studies are made. Collectors of native sugar canes may help appreciably in the solution of some of these problems by giving special attention to the most inferior types available, as these are most likely to be missing links in the complicated history of sugar cane origins and the first to be discarded by the natives when modern improved varieties become available to them.

A partial clarification of the relationships of *S. officinarum* has resulted from a detailed study of numerous noble sugar canes from Micronesia and Polynesia. These groups are of particular interest because they are so obviously different from the large collection of noble sugar canes from New Guinea. Whereas only a very small percentage of the New Guinea noble sugar canes are similar to the clones of *S. officinarum*, practically all of the noble sugar canes now available from east of the New Hebrides have many morphological characteristics in common with *S. officinarum*. In fact, unpublished notes indicate that the floral characteristics that differentiate *S. officinarum* from *S. robustum* are frequently accentuated in clones of noble sugar canes from this area.

The most significant discovery in the present investigation is that many of the original noble sugar canes from Hawaii have a small awned third glume. The third glume is normally absent from *Saccharum officinarum* and *S. robustum*. Many of the clones in question are also different in that they are morphologically sterile. The prophyllletum and glumes, including an awned third glume, are present and apparently normal in every respect, but all the other spikelet structures—palea, lodicules, anthers, and pistil—are absent, except for minute primordia, as in *S. edule* and a species of *Erianthus* (Pl. II, fig. 3) described hereunder. The awn, small but very distinct in structure, is important because it verifies to a great extent a conclusion with respect to the origin of *S. officinarum*, which previously had been surmised (7). On page 149 of that paper it was suggested, on the basis of similarity in the morphology of floral structures, that *Erianthus maximus* Brongn. "is in many respects the most likely species of *Erianthus* that may have played a part in the origin of the large cultivated canes."

The evidence points to *Erianthus maximus* as the second important relative of the noble sugar canes. Before discussing the relationship of this species to the noble sugar canes, specimens familiar to me are here cited:

Erianthus maximus Brongn. in Duperr. Voy. Coq. Bot. 2(2): 97. 1831.

Saccharum pedicellare Trin. in Mém. Acad. St. Pétersb. Math. Phys. Nat. 2: 310. 1832.

SOCIETY ISLANDS: Tahiti, *W. A. Setchell & H. E. Parks* no. 535, July 8, 1922, 18–20 feet high in large clumps in openings on moist slopes on the face of the Diadem, alt. 2500 ft.; S.P.H. nos. 1337 and 1425 from clone *Tahiti-7*, Imp. 852 (in mosaic collection only), vernacular name *Oviri*, from Atimaono, Tahiti, collected by *E. W. Brandes* in 1935; S.P.H. nos. 1353 and 1513 from clone *Raiatea 1*, Imp. 923, from valley, alt. about 600 ft., Raiatea, by *Brandes*.

AUSTRAL ISLANDS: Raivavae, Mt. Muanui, south slope, ravine at edge of forest, alt. 150 m., ascending 2 m. high, sap somewhat sweet, *F. R. Fosberg* no. 11694, Aug. 8, 1934 (mixture of two kinds—typical *E. maximus* and a noble sugar cane—of which only small fragments were seen at the U. S. Nat. Herb.); Rapa, Hiri Valley, bank, by taro patch, apparently cultivated, alt. 50 m., decumbent, plant 3, *H. St. John & Jean Mairean* no. 15633, July 20, 1934.

COOK ISLANDS: *T. F. Cheeseman* no. 719, June 1899, Rarotonga (Kew Herb.).

NEW CALEDONIA: *M. Vieillard* no. 1510, Mt. Panoin, Gatope (Kew Herb., listed by Balansa and Guillaumin as *Saccharum officinarum*); S.P.H. nos. 1514 and 1518 from clone *N.C. 1*, Imp. 1004, originally from near Noumea, by *Brandes*; S.P.H. nos. 1335, 1515, and 1516 from clone *N.C. 132*, Imp. 921, originally from east coast near Kanala, by *Brandes*.

FIJI ISLANDS: *J. Horne* no. 701, 1877–78, the wild red and the white “*vico*” (two sheets in Kew Herb. with notes similar to quotation from 13, p. 69, cited below); *B. Seemann* no. 691, 1860 (as *Eulalia japonica* Trin. in Seem. Fl. Vit. 321, consists of two sheets in Kew Herb., of which one appears to be leaves of *E. maximus* while the other is an immature inflorescence of what appears to be a noble sugar cane); S.P.H. no. 1346 from clone *Fiji 2*, Imp. 861, originally from Nausori, near Suva, Viti Levu, by *J. Matz*, through the courtesy of the Colonial Sugar Refining Co.; S.P.H. nos. 1347 and 1517 from clone *Fiji 3*, Imp. 862, originally from Rarawai, Viti Levu, by *Matz*.

Besides the clones cited, there are six clones in our collection from Viti Levu, Fiji Islands, that are so similar to *Fiji 2* and *Fiji 3* in vegetative characteristics that they must be considered as cultivated derivatives of *Erianthus maximus*. Specimens of the inflorescence of most of these clones are not available as yet and, consequently, they will not be discussed in detail. They are of particular interest because they are the *Duruka* (also *Drauka* and *Daruka*) canes that simulate *S. robustum* so closely in their stem characteristics.

The *Duruka* canes were obtained through the courtesy of the Colonial Sugar Refining Co. The following quotation from a letter with respect to them from Mr. V. Mott is of considerable interest: “The derivation of “*Duruka*” is not known — “*Vico*” by itself means a field of tall grass — “*Duruka Vico*” is a tall cane-like grass that flowers, in contrast with the other varieties of *Duruka* which produce edible heads only . . . The Fijians state that they have never used the *Duruka* juices for sweetening purposes in their cooking, hence apparently the name “*Duruka*” as distinct from the sweeter canes named “*Dovu*.”

“There are known to be nine different varieties of native cane, called *Duruka*, growing in Fiji; they are called by the natives *Duruka Kibo*, *D. Leka*, *D. Coqecoqe*, *D. Toci*, *D. Veirai*, *D. Mirimanu* — producing “cauliflower” edible heads instead of tassels — and *Duruka Vico Vula* (*Vula* =

white), *D. Vico Damu* (*Damu* = red) and *D. Vico Teiniloka* (*Teiniloka* = bronze) producing flowering tassels."

The abortive types of *Duruka* were referred to by Horne (13) in 1881. On page 91 he gives the following account of this unusual vegetable: "Another gramina, the *drauka*, a plant somewhat resembling the sugar cane, is cultivated largely in some parts of Fiji. As a vegetable it is much relished by the Fijians all over the group. The unexpanded panicle of young flowers is the part eaten. If taken when young and tender, properly cooked, and served with butter as sauce, it is reckoned, by some, not inferior to asparagus. I regret that my specimens of this plant were not in fit condition to be named. They were not sufficiently advanced, and from the demand for the flowering shoots, specimens in full flower could not be obtained. To obtain these in Fiji, a *tabu* or prohibition to touch, would require to be put on a few plants."

Horne apparently did not realize that the flower parts of the kinds that are eaten do not mature. The closely related kinds, such as *Fiji* 2 and *Fiji* 3, that flower are extremely tough and fibrous in the boot stage and could not be considered edible except possibly when the inflorescence is in a minute primordial stage. The clones which flower enable us to be fairly certain that this group of grasses is primarily a derivative of *Erianthus maximus*. Hybridization, particularly between diverse forms of *E. maximus* or between such forms and noble sugar canes, undoubtedly was a dominant factor in the origin of the various clones in this group. Inasmuch as there cannot be any certainty about the origin of such a group and because of its unique character, it is desirable that it be given a horticultural name. The name proposed for this group is as follows:

Erianthus maximus Brongn. hort. var. "ABORTIVE." PL. II, FIG. 3.

Fiji ISLANDS: S.P.H. nos. 1522 and 1523 from clone *Fiji* 1, Imp. 860, originally from Nausori, near Suva, Viti Levu.

It is not known if *Fiji* 1 is identical with any of the *Duruka* clones not in our collection. The two *Duruka* clones in our collection that belong to this horticultural group — *Duruka Mirimanu*, Imp. 1021, and *Duruka Coqecoge*, Imp. 1020 — are distinct clones. Detailed descriptions of the vegetative characteristics of the clones in our collection belonging to this group have been prepared by Artschwager (2).

The wild and cultivated forms of *Erianthus maximus* have long been mistaken for wild sugar canes. Horne is only one of many who was confused by this species of grass. The following account by Horne (13, p. 69) with respect to this group of plants in the Fiji Islands is of interest: "Sugar canes *dovo* (*Saccharum officinarum*), are common; both wild and cultivated varieties. The wild varieties grow in dense brakes on the rich alluvial flats and along the sides of small rivers and streams. They frequently grow to a height or length of about 20 feet, with a diameter varying from one-fourth of an inch to an inch. They are of various colours, green, white, or red, and some varieties are striped like a ribbon. The juice of some of the varieties has a faint sweet taste, but that of the

majority is insipid and watery. Their characters at once suggest them to be the plants from which the cultivated varieties of the sugar cane have descended by improvement on successive sorts from a distant period. Improvement on them will be tried in the Botanical Gardens at Mauritius."

The origin of *Saccharum officinarum*, unfortunately, is not as simple as Horne suggests. *Erianthus maximus* is different from *S. officinarum* in many respects. Besides the differences already mentioned, the differences in floral characteristics are most important. The spikelets of *E. maximus* are in every respect larger than those of *S. officinarum*. This also holds true for all the spikelet parts. The difference in size is considerable in that the parts are almost twice as large as corresponding parts of *S. robustum*. With respect to size of spikelet structures, *S. officinarum* appears to be somewhat intermediate between *E. maximus* and *S. robustum* but closer to *S. robustum*. Besides the difference in size of floral structure, not many differences exist between the floral structures of *Erianthus maximus* and *Saccharum officinarum*. The venation of the spikelet structures of *E. maximus* is fairly similar to that of *S. officinarum*. The veins are generally more distinct and the prophyllletum sometimes has one or two additional veins, making a total of 5 or 6 instead of 4. A significant difference is found in the third glume, which is awned in *E. maximus* and generally absent in *S. officinarum*. Awnedness, however, is very likely recessive to absence of third glume. The length of the awn in *E. maximus* varies considerably (11). In the clones from the Fiji Islands and New Caledonia, the awn is greatly reduced and generally does not even extend to the tip of the glumes. Another difference is found in the lodicules, which are very large with numerous cilia along their upper edge in *E. maximus*. In contrast to this, the lodicules in *S. robustum* are very small and not ciliate, while *S. officinarum* may or may not have cilia at each end of the upper edge of this wedge-shaped structure. The fairly frequent occurrence of a second flower in the axil of a fourth glume in the spikelet of *E. maximus* is a character that only rarely occurs in *S. officinarum* or *S. robustum*.

The chromosome number of the various clones of *Erianthus maximus* is of interest. All multiples of 10 from $2n = 60$ to $2n = 100$ are represented. Clone *Raiatea 1*, Imp. 923, from the Society Islands, has a chromosome number of $2n = 60$. *Tahiti 7*, Imp. 852, has about $2n = 70$. *N.C. 132*, Imp. 921, from New Caledonia, as well as *Duruka Vico Vula*, Imp. 1017, and *D. V. Teiniloka*, Imp. 1019, from the Fiji Islands, have $2n = 80$. *Fiji 3*, Imp. 862, has $2n = 90$, while *Duruka Vico Damu*, Imp. 1018, also from Fiji, has $2n = 100$. *N.C. 1*, Imp. 1004, from New Caledonia, may have $2n = 90$ or 100, as this originally was a mixture of two clones of which one part was accidentally discarded and a new count of the remainder has not been completed. The closely related clones of *Erianthus maximus* Brongn. hort. var. "Abortive" have a chromosome number of $2n = 70$ for *Fiji 1*, Imp. 860, and $2n = 80$ for *Duruka Coqecoqe*, Imp. 1020, and *Duruka Mirimanu*, Imp. 1021.

Before discussing further the relationship of *Erianthus maximus* to the

noble sugar canes, it should be pointed out that *E. maximus* is not very closely related to *E. arundinaceus* (Retz.) Jesw., *E. sara* (Roxb.) Rumke (20), and the other species of *Erianthus* of the Eastern Hemisphere. The closest wild relative of *E. maximus* appears to be *E. Trinii* (Hack.) Hack. of Colombia, Brazil, and Paraguay. The *Erianthus* on Easter Island has not been seen by the writer of this paper. *Erianthus maximus*, as here interpreted, has been reported from Samoa and the Marquesas, but not from any area in which *S. robustum* is known to occur.

Artificial hybridization of *Erianthus maximus* and *Saccharum officinarum* or *S. robustum* has not been accomplished so far as is known. It may be necessary to import additional clones before such crosses can be made under conditions in southern Florida, where sugar cane breeding of the Division of Sugar Plant Investigations is conducted. The introduction of clones from such places as Samoa, Austral Islands, and the Marquesas is indicated in any event. The absence of artificial hybrids between *E. maximus* and *Saccharum* makes it difficult critically to evaluate the numerous noble sugar canes from Micronesia and Polynesia, as well as from New Caledonia, which are obviously different from *S. officinarum* as here narrowly interpreted.

On a strictly morphological basis it would seem that many of the noble sugar canes from this area are intermediate forms. Evidence for the assumption that many noble sugar canes are intermediate between *Saccharum officinarum* and *Erianthus maximus* is not as definite as is desired. The most convincing evidence is the presence of a small-awned third glume in some of the noble sugar canes in question. Others have larger pistils and a greater number of spikelets with two florets than one normally finds in *S. officinarum*. Six of about 40 Hawaiian original sugar canes have pinkish lavender midribs in their blades, whereas only two of more than 150 from New Guinea, namely, 28 N.G. 13, Imp. 632 (a reddish purple leaved sugar cane called *Ure* from Abam, Oriomo River, New Guinea, which is very much like *Ireng Malang*, Imp. 1062, *Tomohon Zwart*, Imp. 1090, and *Boetota Bilatoe*, Imp. 1052, in this respect), and 28 N.G. 38, Imp. 477 (*S. edule*) have this character. Of the few clones of *E. maximus* in our collection, *Fiji 2*, Imp. 861, and *Duruka Vico Teiniloka*, Imp. 1019 — likewise *Duruka Mirimanu*, Imp. 1021 (*Erianthus maximus* Brongn. hort. var. "Abortive") — have pinkish lavender midribs. *Duruka Vico Teiniloka*, Imp. 1019, has, in addition, the reddish purple leaves of 28 N.G. 13, Imp. 632. The sheaths of the majority of the noble sugar canes from Polynesia, Micronesia, and New Caledonia are surprisingly free of coarse hairs, whereas those from New Guinea are in many cases very hairy. *Erianthus maximus*, from Fiji and New Caledonia, generally has smooth sheaths, or the hairs that develop are immediately deciduous on protrusion of a sheath from the sheaths below. Clones of *E. maximus* from the Marquesas and *Raiatea 1*, Imp. 923, from the Society Islands, have irritating hairs on the sheaths. Other resemblances and differences will undoubtedly be found as progress is made in the understanding of these complex groups.

On the basis of the morphological and geographical evidence presented in this paper, it is suggested that noble sugar canes are most closely related to *Saccharum robustum* and *Erianthus maximus*. There may have been separate origins of sweet forms in both of these groups, but it seems more likely that the main origins were from *S. robustum* and that as these forms were carried eastward beyond the range of wild *Saccharum* they were modified by hybridization with forms of *E. maximus*. The area in which this modification primarily took place appears to be the Fiji Islands and New Caledonia. Some of the modified forms were found to be superior and were carried back to New Guinea and other areas where *S. robustum* occurred and backcrossing took place. Clones that were carried to areas such as Hawaii in Polynesia apparently inbred, and some of the characteristics which appear to have been obtained from *E. maximus* were accentuated.

Comparative observations of a large number of original sugar canes and related wild forms thus far has permitted considerable advance along the road toward elucidation of the origins of sugar canes. It has become apparent in this study that progress is more certain when all available garden canes and related feral types of an island or region are assembled to compare with similarly complete assemblages from other islands or regions. Individual varieties or limited samplings from a given region are not satisfactory. Fortunately, some of the regional collections have been on a generous basis. They prove that there are a number of geographic points of origin and satellite regions of modification shown by distinctly different group compositions in different areas.

The story of sugar cane origins is by no means told. Critical cytogenetic studies of the complex groups involved remain to be made in testing the suggestions advanced in this paper. The high chromosome numbers found in noble sugar canes and related grasses is a very discouraging factor, which may long delay a better understanding of the plants in question. Another hindrance to rapid progress in the theoretical aspects of the problems of origins of sugar canes is the outbreeding normally practiced in the development of garden forms and new commercial sugar canes.

LITERATURE CITED

1. ARTSCHWAGER, ERNST. A comparative analysis of the vegetative characteristics of some variants of *Saccharum spontaneum*. U. S. Dept. Agr. Technol. Bull. 811: 1-55. 1942.
2. ———. Vegetative characteristics of some wild forms of *Saccharum* and related grasses. (Tech. Bull. in press.)
3. BACKER, C. A. Handboek voor de Flora van Java. Afl. 2. 1928.
4. ———. Onkruidflora der Javasche Suikerrietgronden. Handb. voor de Suikerriet-Cultuur en de Rietsuiker-Fabrigage op Java 7: 38-39. 1928.
5. BRANDES, E. W. Into primeval Papua by seaplane. Nat. Geographic Mag. 56: 253-332, illus. 1929.
6. ——— and G. B. SARTORIS. Sugar cane: Its origin and improvement. U. S. Dept. Agr. Yearbook 1936: 561-623. 1936.

7. ———, G. B. SARTORIS, and C. O. GRASSL. Assembling and evaluating wild forms of sugar cane and closely related plants. Internat. Soc. Sugar Cane Technol. Sixth Cong. Proc. 1938: 128–153, illus. 1939.
8. BREMER, G. The cytology of the sugar cane. The chromosomes of primitive forms of the genus *Saccharum*. *Genetica* 7: 293–322, illus. 1925.
9. ———. Short remarks on the cytology of *Saccharum*. Internat. Soc. Sugar Cane Technol. Proc. 3: 403–408. 1929 [1930].
10. ———. De cytologie van het suikerriet. 7^{de} bijdrage. Een cytologisch onderzoek van een vijftigtal in 1929–1930 op Java geïmporteerde rietsoorten. Arch. V. Suikerindus. Nederland. Indië, Meded. Proefsta. V. Java-Suikerindus. 1934: 141–166, illus. 1934.
11. BROWN, FOREST B. H. Flora of southeastern Polynesia I. Monocotyledons. Bernice P. Bishop Museum Bull. 84: 1–194, illus. 1931.
12. BURKILL, I. H. A dictionary of the economic products of the Malay Peninsula, 2: 1923–1940. 1935.
13. HORNE, JOHN. A year in Fiji, or, an inquiry into the botanical, agricultural, and economical resources of the colony. 297 pp. London. 1881.
14. JESWIET, J. Beschrijving der soorten van het suikerriet. 11^{de} bijdrage. Bijdrage tot de systematiek van het geslacht *saccharum*. Arch. V. Suikerindus. Nederland. Indië Meded. 33: (391)–404, illus. 1925.
15. LAM, H. J. Vegetationsbilder aus den innern von Neu-Guinea. Karsten and Schenck, Vegetationsbilder 15: (5–7). 1924.
16. ———. Fragmenta Papuana (Observations of a naturalist in Netherlands New Guinea). Transl. from the Dutch by Lily M. Perry. *Sargentia* 5: 1–196. 1945.
17. LENNOX, C. G. Sugar cane collecting in New Guinea during 1937. Hawaiian Planters' Record 42: 235–246, illus. 1938.
18. MUNRO, WILLIAM. On the identification of the grasses of Linnaeus's Herbarium, now in possession of the Linnean Society of London. *Jour. Linn. Soc. Bot.* 6: 33–55. 1862.
19. POSTHUMUS, O. Overzicht der op Java inkeensche en ingevoerde oorspronkelijke rietsoorten. Arch. voor de Suiker. in Ned. Indië 2(32): 901–911. 1931.
20. RUMKE, C. L. *Saccharum*-*Erianthus* bastaarden. Arch. Suikerindus. Nederland. Indië, Meded. Proefsta. Java-Suikerindus. 2: 211–263, illus. 1934.
21. STEPHENS, J. C., and J. R. QUINBY. Bulk emasculation of sorghum flowers. *Jour. Amer. Soc. Agron.* 25: 233–234, illus. 1933.

EXPLANATION OF PLATES

PLATE I

Saccharum robustum Brandes and Jesweit. FIG. 1. *A*. Seeds of forma *sanguineum* Grassl. *B*. Anthers. *C*. Pedicellate spikelet. *D*. Rachis segments with spikelets. *E*. Margin of leaf-blade from a clonotype. *B*, *C*, and *D* are from the type of *S. robustum*. FIG. 2. Type of *S. robustum*, deposited in the U. S. National Herbarium. Note that two herbarium sheets are required to accommodate the 65 cm. long tassel. FIG. 3. *A*. Pistil. *B*. Third glume (first lemma) from a topotype. This structure normally is not as long, 1.5 mm., as this example. The dissection of 20 spikelets from the type specimen of *S. robustum* did not reveal any structure in the position where this third glume should be when present. *C*. Lodicules. *D*. Palea. Paleas of *S. robustum* frequently are shorter and broader with more cilia toward the apex. *A*, *C*, and *D* are from the type of *S. robustum*.

PLATE II

FIG. 1. *Saccharum edule* Hassk., clone *Teboe Troeboeg*, Imp. 724, showing the aborted inflorescence and the flag leaf in a dried condition. The cauliflower-like inflorescence remains enclosed within the sheaths of the upper 3 or 4 leaves. FIG. 2. *Saccharum edule*, clone 28 N.G. 201, Imp. 509, showing the aborted inflorescence in a fresh but slightly overripe condition, as indicated by the discoloration at the apex. A customary way of preparing this vegetable for consumption is by roasting. FIG. 3. *Erianthus maximus* Brongn. hort. var. "Abortive," clone *Fiji 1*, Imp. 860. Note that the suppression of development of the inflorescence is not quite as complete as in *Saccharum edule*.

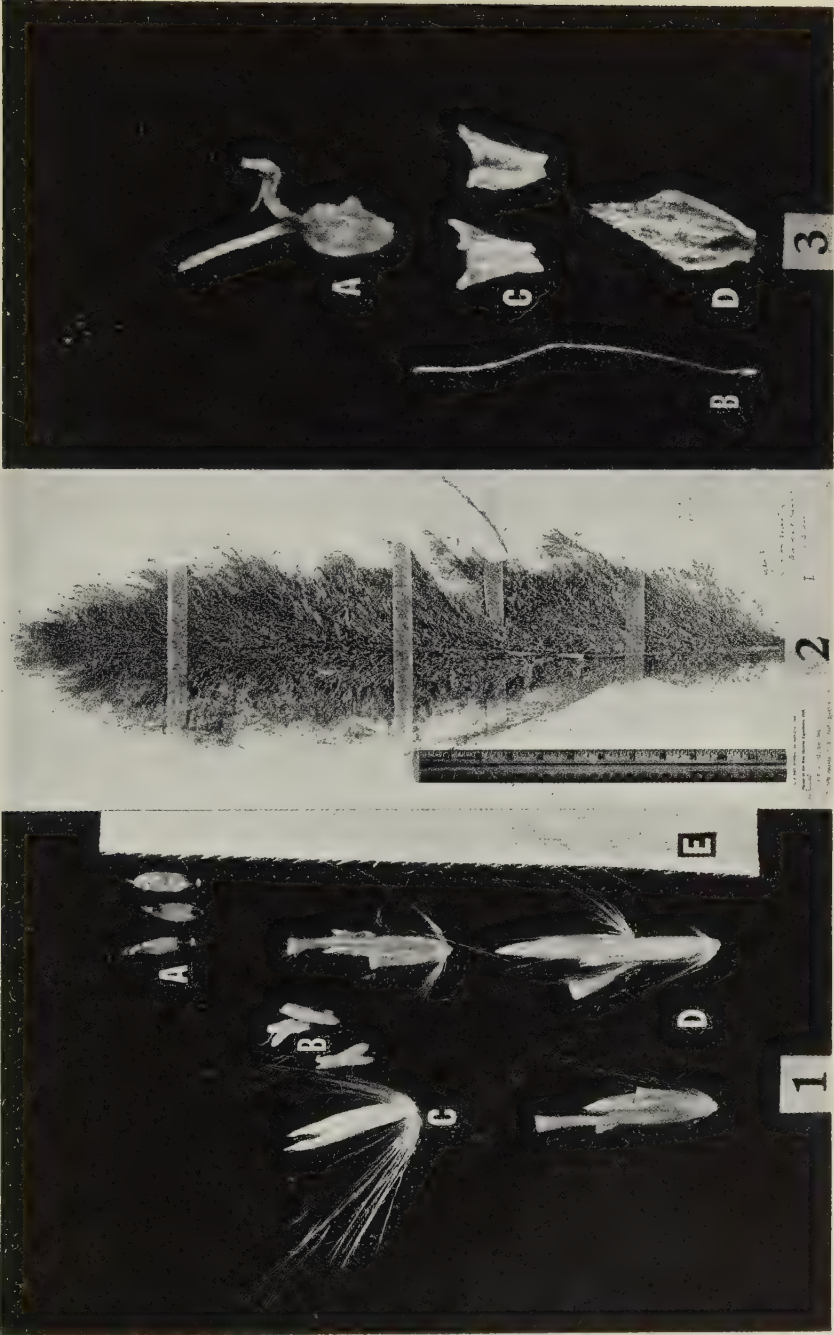
All photographs of Plates I and II are by P. St. C. Browne except Fig. 2 of Plate II, which is by J. F. Brewer.

PLATE III

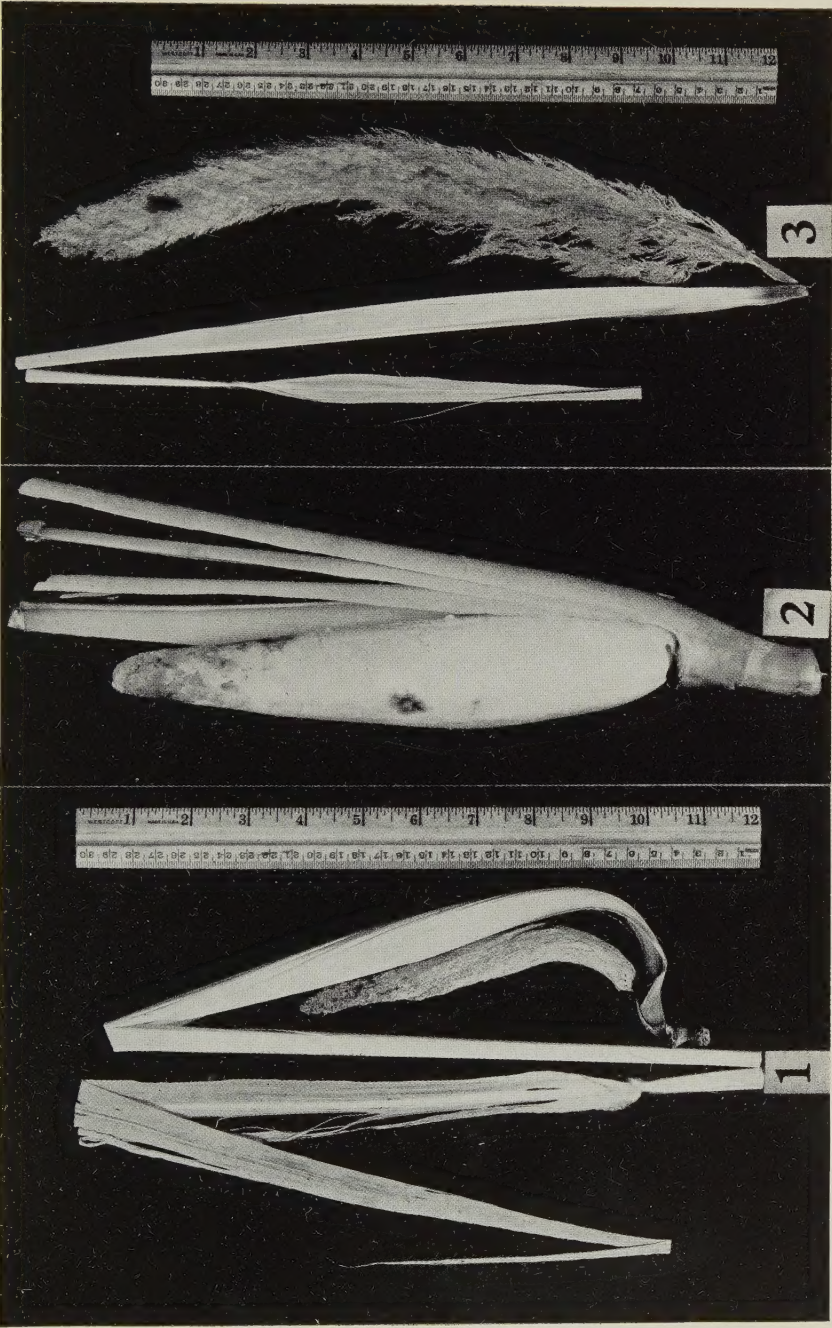
UPPER. Clump of *Saccharum robustum*. Territory of Papua, left bank of Laloki River, the type locality. (Photo by E. W. Brandes.) LOWER. Creeping culms or rhizomes of *Saccharum robustum*, some partly exposed and showing rooted, leafy shoots. The rhizomes sometimes extend 60 feet from the base of an erect stool. Strickland River, Territory of Papua. (Photo by J. Jeswiet.)

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SACCHARUM ROBUSTUM



SACCHARUM EDULE AND ERIANTHUS MAXIMUS



SACCHARUM ROBUSTUM

